



**CITY OF LAFAYETTE
3675 Mount Diablo Blvd., Suite 210
Lafayette, CA 94549**

**LAFAYETTE COMMUNITY CENTER
RESTROOM RENOVATION**

**500 ST. MARYS ROAD
LAFAYETTE, CA 94549**

PROJECT No. 012-9180

PROJECT SPECIFICATIONS

**BID OPENING DATE
TUESDAY, JUNE 15, 2021, 2:00 P.M.**

**LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION
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DOCUMENT 0010 00

NOTICE INVITING BIDS

The City of Lafayette, a California Municipal Corporation, ("City"), hereby gives notice that it will accept bids for construction of the following public work: **Contract No. 012-9180 LAFAYETTE COMMUNITY CENTER RESTROOMS RENOVATION**

BID SUBMISSION: All Bids must be in writing, sealed in an envelope and received by the City at the office of the City Clerk, 3675 Mt. Diablo Boulevard, Suite 210, until 2:00 p.m., on **Tuesday, June, 15th 2021**, after which time they will be publicly opened and read. Any bidder who fails to submit its documentation by the above date and time shall have that Bid rejected and returned unopened. Partial, incomplete or non-responsive Bids, or Bids on other than the Contract Bid Forms, or clear photocopies of such forms, will not be considered. Bids shall be valid for ninety (90) days after the bid opening date.

DESCRIPTION OF THE WORK: : In general the scope of work for the Lafayette Community Center restroom Project ("Project") consists of, but is not limited to the following: targeted demolition, concrete refinishing/reinforcement, rough and finish carpentry, plumbing, gypsum board installation, insulation, tiling, installation of door hardware, restroom fixtures, lighting, electrical, HVAC mechanical work and ducting and other related items needed to support the renovation of a commercial restroom. The Project requires the diversion of a minimum of 65% of all generated solid waste from landfills either by reuse or recycling

The estimated project construction cost is **\$600,000**

BID SECURITY, PERFORMANCE AND PAYMENT BONDS; Bids must be accompanied by cash, a certified or cashier's check, or a Bid Bond in favor of the City in an amount not less than ten percent (10%) of the submitted Total Bid Price issued by a California admitted surety. The successful bidder will be required to furnish, within fourteen (14) days of contract award, a Performance Bond in the amount of one hundred percent (100%) of the Total Bid Price, and a Payment (Material and Labor) Bond in the amount of one hundred percent (100%) of the Total Bid Price, on the forms provided and in the manner described in the Bid Documents.

PREVAILING WAGES: Bidders are advised that this Project is a public work for purposes of the California Labor Code, which requires payment of prevailing wages. The City has obtained from the Director of Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work. These rates will be on file at the City's office or online at <http://www.dir.ca.gov/dlsr>. The successful bidder must pay the prevailing rates, post copies thereof at the job site and otherwise comply with the applicable provisions of state law.

SUBSTITUTION FOR RETENTIONS: Bidders are advised that if awarded this Contract they will be permitted, at their request and expense and in accordance with Section 22300 of the California Public Contract Code, to substitute securities equivalent to monies withheld by the City to ensure performance under the Contract.

REQUIRED CONTRACTOR'S LICENSE: Pursuant to Section 7028.15 of the Business and Professions Code and Section 3300 of the Public Contract Code, all bidders must possess proper licenses for performance of this Contract. A California "**B**" contractor's license is required to bid this contract. Joint ventures must secure a joint venture license prior to award of this Contract. Subcontractors shall possess the appropriate license for the work of their respective trades.

INSTRUCTIONS: Bidders shall refer to Document 00 20 00, "Instructions to Bidders" and Document 00 20 10, "Bid Contents, Evaluation, and Selection" for required documents and items to be submitted in

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a sealed envelope.

SITE VISIT: City will conduct a mandatory pre-bid conference. It is the Bidder's responsibility to attend to observe the existing site conditions to fully understand the project and potential restrictions which may impact the total and adequate completion of the Project. The pre-bid conference will be held on **Tuesday, May 25th 2021, 11 a.m** at the project site.

BIDDING DOCUMENTS: Documents, including the Plans and Specifications, will be available starting **Monday, May 10th, 2021**, and may be ordered by contacting John Warshaw, City Recreation Department Office, jwarshaw@ci.lafayette.ca.us, or (925) 284-0830

BID PREPARATION COST: Bidders are solely responsible for the cost of preparing their Bids.

RESERVATION OF RIGHTS: City specifically reserves the right, in its sole discretion, to reject any or all Bids, or re-bid, or to waive inconsequential deviations from bid requirements not involving time, price or quality of the work. The award, if made, will be made to the lowest responsible bidder whose bid is determined responsive to the Bid Documents. The lowest bid shall be determined on the basis of the base bid only.

INQUIRIES: Questions regarding the bidding documents may be directed to John Warshaw, City Recreation Department Office, jwarshaw@ci.lafayette.ca.us, or (925) 284-0830. Any questions regarding the interpretation or clarification of the Contract Bid Forms or the Bid Documents must be submitted in writing.

Date: 5/3/2021

By: 
Jonathan Katayanagi, Parks, Trails & Recreation Director

END OF DOCUMENT

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DOCUMENT 00 20 00

INSTRUCTIONS TO BIDDERS

1. RECEIPT OF BIDS. City will receive sealed Bids at Office of the City Clerk, 3675 Mt. Diablo Boulevard, Suite 210, until 2:00 p.m., on **Tuesday, June 15th 2021**, after which time they will be publicly opened and read. Bids shall contain items listed in Document 00 20 10, "Bid Contents, Evaluation, and Selection," and in the manner described in Document 00 20 00. Bidder shall mark its Bid as "Bid for **Lafayette Community Center Restroom Renovation.**"; **Project No. 012-9180 .**"

2. DETERMINATION OF APPARENT LOW BIDDER. Apparent Low Bid will be based solely on the total amount of the Base Bid, not including Alternate Bid Items, if any. However, all Bidders are required to submit bids on all Bid Items.

3. REQUIRED BID FORM. All Bidders must submit Bids on Document 00 41 00, "Bid Form." City will reject as non-responsive any Bid not submitted on the required form. Bids must be full and complete. Bidders must complete all Bid items and supply all information required by Bidding Documents and Specifications. City reserves the right in its sole discretion to reject any Bid as non-responsive as a result of any error or omission in the Bid. Bidders may not modify the Bid Form or qualify their Bids. Bidders must submit clearly and distinctly written Bids. Bidders must clearly make any changes in their Bids by crossing out original entries, entering new entries and initialing new entries. City reserves the right to reject any Bid not clearly written.

The Bid Form shall be signed by the Contractor's legal representative as indicated on the Bid Form. If the Bid is made by an individual, it shall be signed and his full name and his address shall be given; and if it is by a corporation, the proposal shall show the name of the corporation and the State under the laws of which the corporation was chartered. When the Bid is signed by the duly authorized officer or officers of the corporation, it shall be attested by the corporate seal, and the names and titles of the principal officers of the corporation shall be given. When Bid is signed by an agent, other than the officer or officers of a corporation authorized to sign contracts on its behalf, a "Power of Attorney" must be filed with the City prior to opening bids or shall be submitted with the Bid; otherwise, the Bid may be rejected as irregular and unauthorized.

4. REQUIRED BID SECURITY. Bidders must submit with their Bids either cash, a cashier's check or certified check on a responsible bank in the United States, or corporate surety bond furnished by a surety that meets State of California bonding requirements and is admitted by the State as defined in Code of Civil Procedure Section 995.120 of not less than ten percent (10%) of aggregate amount of Base Bid, payable to City. Bidders shall use the required form of corporate surety bond, Document 00 41 10, "Bond Accompanying Bid." City will reject as non-responsive any Bid submitted without the necessary Bid security. Certified or cashier's checks must be drawn on a solvent state bank or a California branch of a solvent national bank.

The City may retain Bid security of other than the Apparent Low Bidder for a period of ninety (90) days after full execution of the Contract. The City may award the Contract to the next Apparent Low Bidder if the Apparent Low Bidder is determined non-responsive or non-responsible or fails to execute the Contract and provide the required bonds, guarantees and other documents within the required time periods. Upon full execution of the Contract, submission of necessary bonds, original insurance certificates and endorsements, and any other certifications as may be required by the Contract, the City will return to the respective unsuccessful Bidders all Bid securities and Bid bonds. If the City rejects all Bids, it will promptly return to all Bidders their Bid securities.

5. REQUIRED SUBCONTRACTORS LIST. All Bidders must submit with their Bids, the required information on all subcontractors in Document 00 45 10, "Subcontractors List," for those subcontractors who will perform any portion of work, including labor, rendering of service, or specially fabricating and installing a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of total Bid. Violation of this requirement

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may result in Bid being deemed non-responsive and not being considered. Pursuant to Public Contract Code Section 4104, the City has determined that it will not allow Bidders twenty-four (24) additional hours after the deadline for submission of bids to submit the information required by the City about each subcontractor, other than the name and location of each subcontractor.

6. REQUIRED DOCUMENTS. All Bidders must submit with their Bids all documents identified in Document 00 20 10, "Bid Contents, Evaluation, and Selection."

7. SITE VISIT. City will conduct a mandatory pre-bid conference. It is the Bidder's responsibility to attend to observe the existing site conditions to fully understand possible difficulties and or restrictions which may impact the total and adequate completion of the Project. The pre-bid conference will be held on **Tuesday, May 25th 2021, 11 a.m** at the Lafayette Community Center office, 500 St Mary's Road.

8. OTHER REQUIREMENTS PRIOR TO BIDDING. Submission of Bid signifies Bidder's careful examination of Bidding Documents and complete understanding of the nature, extent and location of Work to be performed. As a condition to Bidding, Bidder must complete tasks listed in Document 00 52 10, "Agreement," Article 5. Submission of Bid shall constitute Bidder's express representation to the City that Bidder has fully completed these tasks.

9. EXISTING CONDITIONS. Bidders shall examine any available existing conditions information.

10. ADDENDA. If any person contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of the Contract Documents, or finds discrepancies in, or omissions from the plans or specifications; he may submit to the City a written request for an interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery at least 7 days prior to the bid opening. Interpretation or correction of the proposed documents will be made only by addendum duly issued, and a copy of such addendum will be mailed or delivered to each person receiving a set of such documents.

It is the bidder's responsibility to inquire, prior to submitting the bid, whether the City has issued any Addenda.

The City shall not be deemed responsible for any oral clarification nor will it be binding.

Addenda may also be issued to modify the Bidding Documents as deemed advisable by City. Addenda shall be acknowledged in Bid Form by number and shall be part of the Contract Documents. A complete listing of Addenda may be secured from City. Bidders are primarily and ultimately responsible for ensuring that they have received any and all Addenda. Pursuant to Public Contract Code Section 4104.5, if the City issues an Addendum later than 72 hours prior to the deadline for submission of bids, and the Addendum requires material changes, additions or deletions to the description of the work to be performed or the content, form or manner of submission of bids, the City will extend the deadline for submission of bids by at least 72 hours. Otherwise, the City may determine, in its sole discretion, whether and Addendum requires that the date set for opening bids be postponed. The announcement of the new date, if any, shall be made by Addenda.

11. SUBSTITUTIONS. Bidders must base their Bids on products and systems specified in Contract Documents or listed by name in Addenda. Substitutions may be requested after Award of Contract only in accordance with requirements specified in Specifications Section 01 62 00, "Product Options." Substitutions so requested may be granted at City's sole discretion.

12. WAGE RATES. Bidders are advised that this Contract is a public work for purposes of the California Labor Code, which requires payment of prevailing wages. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the State of California Department of Industrial Relations, are on file at City's office and online at <http://www.dir.ca.gov/dlsr>, and are deemed included in the Bidding Document. Upon request, City will make available copies to any interested party.

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13. EQUAL EMPLOYMENT OPPORTUNITY. Contractor shall comply with all applicable federal, state and local laws, rules and regulations in regard to nondiscrimination in employment because of race, color, ancestry, national origin, religion, sex, marital status, age, medical conditions, disability or any other reason.

14. BID OPENING. The City will stamp Bids with date and time upon receipt. Bids will be opened and read publicly at the time and place indicated in Paragraph 1 above. Bidders or their authorized agents may be present. After opening of Bids, the City will review all Bids for accuracy and reserves the right to correct obvious errors. Upon completion of review, Bid will be ranked by the bid amount and the apparent low bidder will be determined and notified.

15. WITHDRAWAL, DISQUALIFICATION, AND RELIEF OF BIDS. Section 2-3 and 2-6 of the City of Lafayette Standard Specifications General Provisions shall apply.

No Bidder shall be allowed to make, submit or be interested in more than one bid. However, a person, firm, corporation or other entity that has submitted a subproposal to a bidder, or that has quoted prices of materials to a bidder, is not thereby disqualified from submitting a subproposal or quoting prices to other bidders submitting a bid to the City.

Reasonable grounds for believing that any firm is interested in more than one proposal for the Work may cause rejection of all proposals in which such firm is interested. If there is reason to believe that collusion exists among the Bidders, any or all proposals may be rejected, and none of the participants in such a collusion shall be considered in future proposals. Proposals in which the prices are obviously unbalanced, those that are incomplete, those that show any alteration of form or contain any additions or conditions, and alternate bids that are not called for or otherwise permitted, may be rejected.

16. BID PROTEST. Any Bid protest must be submitted in writing to the Office of the City Clerk, 3675 Mt. Diablo Boulevard, Suite 210, Lafayette, CA 94549, before 5 o'clock p.m. of the fifth (5th) calendar day following the date of bid opening.

- a. The initial protest document must contain a complete statement of the basis for the protest.
- b. The protest must refer to the specific portion of the Bid that forms the basis for the protest.
- c. The protest must include the name, address and telephone number of the person representing the protesting party.
- d. The protest must include all relevant, supporting documentation with the protest at the time of the filing.

The party filing the protest must concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

The procedure and time limits set forth in this paragraph are mandatory and are Bidder's sole and exclusive remedy in the event of a Bid Protest. Bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue the Bid protest, including filing a Government Code Claim or legal proceedings. A Bidder may not rely on a protest submitted by another Bidder but must timely pursue its own protest.

17. FAILURE TO EXECUTE AND DELIVER DOCUMENTS. If Bidder to whom Contract is awarded shall for fourteen (14) days after such award fail or neglect to execute and deliver all required Contract Documents and file all required bonds, insurance certificates, Escrow Bid Documents, and other documents, City may, in its sole discretion, deposit Bidder's surety bond, cashier's check or certified check for collection, and retain the proceeds thereof as liquidated damages for Bidder's failure to enter into the Contract Documents. Bidder agrees that calculating the damages City may suffer as a result of Bidder's failure to execute and deliver all required Contract Documents would be

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extremely difficult and impractical and that the amount of Bidder's required Bid security shall be the agreed and presumed amount of City's damages.

18. SCHEDULE OF THE WORK. The Work shall be completed finally and in its entirety within 60 working days from the date when the contract time commences to run. City expressly reserves the right to modify the date for the Commencement of Work under the Contract to independently perform and complete work related to the Project, without limitation. City accepts no responsibility to Contractor for any delays attributed to its need to complete independent work at the Site.

19. COORDINATION OF WORK. In accordance with the provisions Document 00 72 00, "General Conditions," Part 6, City reserves the right to undertake construction and to award separate contracts for work at the Site, the extent of which may not be known by City until after Award of Contract.

20. AWARD. If the contract is to be awarded, it will be awarded to the lowest responsible responsive Bidder within 90 calendar days after the Bid Opening.

21. DEFINITIONS. All definition of terms used in these Instructions are set forth in Specifications Section 01 42 10, "References and Definitions."

END OF DOCUMENT

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DOCUMENT 00 20 10

BID CONTENTS, EVALUATION, AND SELECTION

1. This Document establishes the required Bid contents and City's procedures for opening and evaluating Bids for an award of: **Contract No. 012-9180, LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION.**
2. All definitions of terms used herein are defined in the Division 01 Specifications, Section 01 42 10, "References and Definitions".
3. Bid shall be submitted in a sealed envelope. City will open all bids and determine an Apparent Low Bidder as specified herein.

Contents of Bid Envelope:

- a. Document 00 41 00 - Bid Form.
 - b. Bid Security supplied in accordance with Document 00 20 00, "Instructions to Bidders."
 - c. Document 00 42 10 - Declaration of Contractor's License Status.
 - d. Document 00 45 10 - Subcontractors List.
 - e. Document 00 45 17 - Principals Interested in this Bid.
 - f. Document 00 44 00 - Affidavit of Compliance with Ethical Standards.
 - g. Document 00 45 19 - Non-Collusion Declaration.
 - h. Document 00 45 27 - Worker's Compensation Insurance Certificate.
4. **DETERMINATION OF APPARENT LOW BIDDER.** Apparent Low Bid will be based solely on the total amount of the Bid Price indicated on the Bid Form. Determination of the Low Bid will not include any alternate bid items.
 5. **BID EVALUATION.** City may reject any or all Bids and waive any informalities or minor irregularities in the Bids, or inconsequential deviation from bid requirements. City also reserves the right and discretion to reject any or all Bids and to re-bid the Project without cause. City reserves the right to reject any or all nonconforming, non-responsive, unbalanced or conditional Bids, re-bid, and to reject the Bid of any Bidder if City believes that it would not be in the best interest of Project to make an award to that Bidder, whether because the Bid is not responsive or a proposed subcontractor is unqualified, or of doubtful financial ability, or fails to meet any other pertinent standard or criteria established by City. For purposes of this paragraph, an "unbalanced Bid" is one having nominal prices for some work items and enhanced prices for other work items, or disproportionate loading of overhead and profit to certain items, or price manipulation of any kind among the items aggregated to arrive at the Bid.
 - a. In evaluating Bids, City will consider qualifications of subcontractors proposed, whether or not the Bids comply with the prescribed requirements, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - b. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between written words and figures, or words and numerals, will be resolved in favor of the words.
 - c. Quantities stated in the Bidding Documents are approximate only and are subject to correction upon final measurement of the work and are subject further to the rights reserved by the City to increase or diminish the amount of work under any classification as advantages to design or construction needs require.

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DOCUMENT 00 32 00

EXISTING CONDITIONS

1. **NOTICE.** The available information regarding the Site described herein is not a part of the Contract Documents.
2. **(NOT USED)**
3. **USE OF INFORMATION ON EXISTING CONDITIONS**
 - A. Above-Ground Existing Conditions. Under no circumstances shall City be deemed to make a warranty or representation of existing aboveground conditions, as-built conditions, or other aboveground actual conditions verifiable by reasonable independent observation and investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder must perform prior to bidding and Bidder must not rely on the information supplied by City regarding existing conditions. Bidder represents and agrees that in submitting its Bid, it is not relying on any information regarding existing conditions supplied by City and, instead, is relying on its own independent investigation of the site and its surroundings.
 - B. Underground Facilities. Information regarding existing Underground Facilities at or contiguous to the Site is based on information furnished to City by others. Except as expressly set forth in this Document 00 32 00, City does not assume responsibility for the accuracy, completeness or thoroughness of this information, and Bidder is solely responsible for any interpretation or conclusion drawn from this information. Except as expressly set forth in this Document 00 32 00, City will be responsible only for the general accuracy of information regarding Underground Facilities (i) that are owned by City, and (ii) only if Bidder has conducted the independent investigation required of it and discrepancies were not apparent or discoverable upon a reasonable investigation.
 - C. Bidder represents and agrees that in submitting its bid, it is not relying on any information that is made available by City, except as expressly set forth in this Document 00 32 00, but, rather, it relies on its own investigation and assessment of existing conditions, including subsurface and underground conditions and facilities.
4. **(NOT USED)**
5. **INVESTIGATIONS**
 - A. Before submitting a Bid, each Bidder will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site or otherwise, which may affect cost, progress, performance or furnishing of Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of Contract Documents, including:
 - i. Conditions bearing upon transportation, disposal, handling, and storage of materials,
 - ii. Availability of labor, water, electrical power, and roads,
 - iii. Uncertainties of weather, underground water conditions, or similar physical conditions at the site,
 - iv. Character of equipment and facilities needed preliminary to and during the performance of Work.

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- B. City has provided time in the period prior to bidding for Bidder to perform these investigations.
- C. Contractor acknowledges that he has satisfied himself as to the character, quality, and quantity of surface and subsurface materials, obstacles and conditions to be encountered insofar as this information is reasonably ascertainable from Contractor's independent inspection of the site and review of the Bid Documents. Any failure of Contractor to take the actions prescribed in this Document 00 32 00 will not relieve Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the Work without additional expense to City.

6. ACCESS TO SITE.

- A. On written request to City, City will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, and studies as each Bidder deems necessary for submission of a Bid. Bidders must clean up and restore the Site to its former conditions upon completion of such explorations, investigations, and studies. Such investigations may be performed only under the provisions of Document 00 72 00, "General Conditions," including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work.

END OF DOCUMENT

**LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION
500 ST. MARYS ROAD
LAFAYETTE, CA 94549**

DOCUMENT 00 41 00

BID FORM

To: **City of Lafayette**

Re: **LAFAYETTE COMMUNITY CENTER RESTROOMS RENOVATION. 012-9180**

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with City in the form of Document 00 52 10, "Agreement," in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the sum indicated in this Bid and in accordance with all other terms and conditions of Contract Documents.
2. Bidder accepts all of the terms and conditions of the Contract Documents and the Invitation to Bid and Instructions to Bidders, including without limitation, those dealing with the disposition of Bid Security. Bidder will sign and submit the Agreement with Bonds and other documents required by Document 00 72 00, "General Conditions," Part 3, including but not limited to the Escrow Bid Documents, within fourteen (14) calendar days after receipt of City's Notice of Award.
3. In submitting this Bid, Bidder represents:
 - (a) Bidder has examined copies of all of the Contract Documents and of the following Addenda (receipt of all of which is hereby acknowledged).

<u>Date</u>	<u>Number</u>	<u>Date</u>	<u>Number</u>

- (b) Bidder has visited the Site and performed all tasks, research, investigation, reviews, examinations, analysis, and given notices, regarding the Project and the Site, as set forth in Document 00 52 10, "Agreement," Article 5.
4. Based on the foregoing, Bidder proposes and agrees to fully perform the Work within the time stated and in accordance with the Contract Documents for the following sum of money listed as follows:

No.	Item	Bid Price
1	All-Risk Construction Insurance	\$
2	Excluding #1 above, all labor, materials, tools, equipment, and services necessary and incidental to complete all Work shown in the Project Plans, Specifications, and other Contract Documents	\$
	TOTAL BASE BID	\$

5. Subcontractors are listed on the attached document 00 45 10, Subcontractors List.
6. The undersigned understands that City reserves the right to reject this Bid, but that this Bid shall remain open and shall not be withdrawn for a period of ninety (90) days from the date prescribed for its opening.
7. City is not obligated to award Bid Alternate items (if any); however, Bidders must complete the

**LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION
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Bid Form for all items.

8. Notices or request for additional information may be addressed to the undersigned at the address below.
9. The undersigned herewith encloses a cashier's check, certified check or surety bond from an admitted surety authorized to do business in California pursuant to Code of Civil Procedure Section 995.120 in the amount of ten percent (10%) of the total of Base Bid Items and made payable to: City of Lafayette.
10. The undersigned agrees to commence work under this Contract on the date established in Document 00 72 00, General Conditions, and to complete all work within the time specified in Document 00 52 10, Agreement.
11. The undersigned agrees to liquidated damages for failure to complete all contract work within the time specified as set forth in Document 00 52 10, Agreement, and Document 00 72 00, General Conditions.
12. The names of all persons interested in the foregoing Bid as principals are set forth in Document 00 45 17, "Principals Interested in Bid."
13. Bidder is licensed in accordance with an act for the registration of Contractors, and with license number set forth in Document 00 42 10, "Declaration of Contractor's License Status."

(Signatures on the next page)

**LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION
500 ST. MARYS ROAD
LAFAYETTE, CA 94549**

Legal Name of Firm: _____

Business Address: _____

_____ Telephone Number: _____

Type of Organization: () Individual () Corporation

Authorized Signature: _____ Date of Execution: _____

Name: _____ Position: _____

NOTE: If Bidder is a corporation, set forth the legal name of the corporation together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation.

For a corporation, name president, secretary, treasurer and manager.

NAME	TITLE
_____	_____
_____	_____
_____	_____
_____	_____

Corporate Seal:

END OF DOCUMENT

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DOCUMENT 00 41 10

**BOND ACCOMPANYING BID
City of Lafayette Project No. 012-9180
Lafayette Community Center Restroom Renovation**

KNOW ALL BY THESE PRESENTS:

That the undersigned, _____, as Bidder, and the undersigned, as Surety, are held and firmly bound unto the City of Lafayette, a California Municipal Corporation ("City"), as obligee, in the penal sum of

_____ Dollars (\$ _____) lawful money of the United States of America being at least ten percent (10%) of the aggregate amount of said Bidder's Base Bid for the above project, for the payment of which, well and truly to be made, we bind ourselves, our successors, executors, administrators, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Bidder is submitting a bid for City Contract No. 012-9180 , **Lafayette Community Center Restroom Renovation**

THE CONDITION OF THIS OBLIGATION IS SUCH that if the bid submitted by said Bidder be accepted and the contract be awarded to said Bidder, and said Bidder shall within a period of fourteen (14) calendar days after such award enter into the contract so awarded and provide the required Performance Bond, Labor and Material Payment Bond, insurance certificates and all other endorsements, forms and documents required under Document 00 72 00, "General Conditions," then this obligation shall be void, otherwise to remain in full force and effect. In the event suit is brought upon this bond by the City and judgment is recovered, said Surety shall pay all costs incurred by the City in such suit, including reasonable attorneys' fees to be fixed by the court.

IN WITNESS WHEREOF, the parties hereto have executed this instrument this ____ day of _____, __21.

By: _____ Bidder

_____ Surety

Subscribed and sworn to this ____ day of _____, 21.

NOTARY PUBLIC _____

END OF DOCUMENT

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GENERAL LIABILITY:

CARRIER: _____

ADDRESS: _____

PHONE: _____

POLICY NUMBER: _____ POLICY LIMITS: \$ _____

AUTOMOTIVE LIABILITY:

CARRIER: _____

ADDRESS: _____

PHONE: _____

POLICY NUMBER: _____ POLICY LIMITS: \$ _____

SAFETY EXPERIENCE

The following statements as to safety experience of Bidder are submitted with bid, as part thereof, and the truthfulness and accuracy of information are guaranteed by Bidder.

1. List your firm's interstate Experience Modification Rate for the last three years:
2018 _____ 2019 _____ 2020 _____
2. Use your last year's Cal/OSHA log to fill in the following number of injuries and illnesses:
 - a. Number of lost workday cases _____
 - b. Number of medical treatment cases _____
 - c. Number of fatalities _____
3. Employee hours worked last year _____
4. State the name of your firm's safety engineer/manager: _____
Attach a resume or outline of this individual's safety and health qualifications and experience.

I CERTIFY, UNDER PENALTY OF PERJURY, THAT THE FOREGOING INFORMATION IS CURRENT AND ACCURATE AND I AUTHORIZE CITY OF LAFAYETTE, AND ITS AGENTS AND REPRESENTATIVES, TO OBTAIN A CREDIT REPORT AND/OR VERIFY ANY OF THE ABOVE INFORMATION.

NAME OF FIRM _____

SIGNATURE _____

TITLE: _____

DATE: _____

END OF DOCUMENT

**LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION
500 ST. MARYS ROAD
LAFAYETTE, CA 94549**

DOCUMENT 00 42 10

DECLARATION OF CONTRACTOR'S LICENSE STATUS¹

I, _____, declare under penalty of perjury under the laws of the State of California that the following is true and correct:

1. The State Contractor's license number for the signatory Contractor is: _____.
2. The license expiration date is: _____.
3. Contractor's Responsible Managing Employee or Responsible Managing Officer is
_____.
4. Contractor has not been disbarred or otherwise legally precluded from working on this project.

Executed on _____, _____, 21, at _____, California.

Contractor's Firm Name – Print or Type

Signatory's Name – Print or Type

Signature

Capacity in Contracting Firm – Print or Type

END OF DOCUMENT

¹ California Business & Professions Code § 7028.15.

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3. What are the differences between the proposed substitution and the specified item? If proposed substitution has a color or pattern, provide a color board showing proposed substitution in relation to the other adjacent colors and patterns.

4. Manufacturers' guarantees and warranties of the proposed and specified items are:
_____ Same _____ Different. (If different, explain. Attached additional sheet if necessary.)

The undersigned Bidder certifies that the function, appearance, and quality of the proposed substitution are equivalent or superior to those of the specified item, and agrees to the terms of Section 01 62 00, "Product Options."

Submitted by:

Firm

Signature

Name

Address

Telephone:

Date:

For Use by City of Lafayette:

____ Accepted ____ Accepted as Noted

____ Not Accepted ____ Rec'd Too Late

By: _____

Date: _____

Remarks: _____

END OF DOCUMENT

**LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION
500 ST. MARYS ROAD
LAFAYETTE, CA 94549**

DOCUMENT 00 44 00

**AFFIDAVIT OF COMPLIANCE WITH ETHICAL STANDARDS
CITY OF LAFAYETTE**

I, _____, being first duly sworn, depose and say to City of Lafayette ("City") that:

1. I am _____ *[insert title or capacity]* of _____ *[insert entity name]* ("Bidder").
2. I hereby state that I have read and understood the attached Document 00 44 10, "Ethical Standards for Contractors." I have examined appropriate business records, and I have made inquiry of those individuals potentially included within the definition of "Contractor" contained in Document 00 44 10. I have authority to make these representations on my own behalf and on behalf of the legal entity herein identified.
3. Neither (a) Bidder nor (b) any individual(s) belonging to a category identified in footnote no. 1 of Document 00 44 10 has been convicted of any one or more of the crimes identified in Document 00 44 10 within the past five (5) years.
4. Notwithstanding award of any contract by City or performance thereunder, the City shall have all rights and remedies described in Document 00 44 10.

The above assertions are true and correct and are made under penalty of perjury under the laws of the State of California.

Name of Firm

Signature

Title

Note: Written evidence of the authority of the person executing this affidavit on behalf of a corporation or any other legal entity, other than a sole proprietorship, shall be attached.

Subscribed and sworn to this _____ day of _____, ____ 21.

NOTARY PUBLIC _____

END OF DOCUMENT

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DOCUMENT 00 44 10

ETHICAL STANDARDS FOR CONTRACTORS

1. City may, at its sole discretion, terminate any contract with Contractor if any of the following occurs:
 - A. If Contractor¹ does any of the following:
 - i. Is convicted² of operating a business in violation of any Federal, State or local law or regulation;
 - ii. Is convicted of a crime punishable as a felony involving dishonesty;³
 - iii. Is convicted of an offense involving dishonesty or is convicted of fraud or a criminal offense in connection with: (1) obtaining; (2) attempting to obtain; or (3) performing a public contract or subcontract;
 - iv. Is convicted of any offense which indicates a lack of business integrity or business honesty which seriously and directly affects the present responsibility of a City contractor or subcontractor; or
 - v. Made (or makes) any false statement(s) or representation(s) with respect to the contract; or
 - B. If fraudulent, criminal, or other seriously improper conduct of any officer, director, shareholder, partner, employee, or other individual associated with Contractor can be imputed to Contractor when the conduct occurred in connection with the individual's performance of duties for or on behalf of Contractor, with Contractor's knowledge, approval or acquiescence, Contractor's acceptance of the benefits derived from the conduct shall be evidence of such knowledge, approval, or acquiescence.
2. City may also terminate any contract with Contractor if any one or more of the following occurs:
 - A. If Contractor becomes "insolvent";⁴
 - B. If City determines that Contractor no longer has the financial capability or business experience including, without limitation, loss of personnel deemed essential by City to perform successfully the terms of, or operate under, any contract with City; or
 - C. If City determines that Contractor fails to submit information, or submits false information, which is required to perform or be awarded a contract with City, including, but not limited to, Contractor's failure to maintain a required state issued license, failure to obtain a City business license (if applicable), or failure to purchase and maintain bonds and/or insurance policies required under any contract with City.

¹ For purposes of this document, the term "Contractor" (whether a person or a legal entity) means any of the following: an owner or co-owner of a sole proprietorship; a person who controls or who has the power to control a business entity; or a person who owns more than ten percent (10%) of the outstanding stock of a corporation and who is active in the day to day operations of that corporation.

² For purposes of this document, the terms "convicted" or "conviction" mean a judgment or conviction of a criminal offense by any court of competent jurisdiction, whether entered upon a verdict or a plea, and includes a conviction entered upon a plea of nolo contendere within the past five (5) years.

³ For purposes of this document, the term "dishonesty" includes, without limitation, embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, failure to pay tax obligations, receiving stolen property, collusion or conspiracy.

⁴ For purposes of this document, Contractor is "insolvent" if it is unable to pay its debts as they become due, transfers assets in fraud of creditors, makes an assignment for the benefit of creditors, files a petition under any section or chapter of the federal Bankruptcy Code (11 U.S.C.), as amended, or under any similar law or statute of the United States or any state thereof, is adjudged bankrupt or insolvent in proceedings under such laws, or a receiver or trustee is appointed for all or substantially all of Contractor's assets.

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3. In the event a prospective Contractor (or Bidder) is ruled ineligible (debarred) to participate in a contract award process, or a contract is terminated pursuant to these provisions, Contractor may appeal City's action to the Lafayette City Council by filing a written request with the City Clerk within ten (10) calendar days of the notice given by City. The matter will be heard within thirty (30) days of the filing of the appeal request with the City Clerk. Contractor shall have the burden of proof on the appeal. Contractor shall have the opportunity to present evidence, both oral and written.

END OF DOCUMENT

**LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION
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DOCUMENT 00 45 17

PRINCIPALS INTERESTED IN THIS BID

THE NAMES OF ALL PERSONS WHO HAVE AN INTEREST IN THIS BID AS PRINCIPALS ARE AS FOLLOWS:

(Note: If Bidder is a corporation, list the names of the President, Secretary, Chief Financial Officer, General Manager thereof. If Bidder is an individual, state first and last name in full.)

Principal's Name:	
Last 4 digits of Social Security Number:	
Mailing Address:	
Office:	

Principal's Name:	
Last 4 digits of Social Security Number:	
Mailing Address:	
Office:	

Principal's Name:	
Last 4 digits of Social Security Number:	
Social Security Number:	
Mailing Address:	
Office:	

Principal's Name:	
Last 4 digits of Social Security Number:	
Mailing Address:	
Office:	

Principal's Name:	
Last 4 digits of Social Security Number:	
Mailing Address:	
Office:	

Note: Attach additional pages if necessary.

END OF DOCUMENT

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DOCUMENT 00 45 19

NON-COLLUSION DECLARATION
(To be executed by Bidder and submitted with Bid)

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid. The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____ [date], at _____ [city], _____ [state].

Name of Firm

Corporate Seal:

Signature

21

Date

Title

Subscribed and sworn to this _____ day of _____ of _____ 21.

NOTARY PUBLIC _____

END OF DOCUMENT

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DOCUMENT 00 45 20

IRAN CONTRACTING ACT CERTIFICATION

(Public Contract Code section 2200 et seq.)

As required by California Public Contract Code section 2204, the Contractor certifies subject to penalty for perjury that the option checked below relating to the Contractor's status in regard to the Iran Contracting Act of 2010 (Public Contract Code section 2200 et seq.) is true and correct:

- The Contractor is not:
 - (i) identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code section 2203; or
 - (ii) a financial institution that extends, for 45 days or more, credit in the amount of \$20,000,000 or more to any other person or entity identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code section 2203, if that person or entity uses or will use the credit to provide goods or services in the energy sector in Iran.

- City has exempted the Contractor from the requirements of the Iran Contracting Act of 2010 after making a public finding that, absent the exemption, City will be unable to obtain the goods and/or services to be provided pursuant to the Contract.

- The amount of the Contract payable to the Contractor for the Work does not exceed \$1,000,000.

Signature _____

Title _____

Firm _____

Date _____

Note: In accordance with Public Contract Code section 2205, false certification of this form shall be reported to the California Attorney General and may result in civil penalties equal to the greater of \$250,000 or twice the Contract Price, termination of the Contract and/or ineligibility to bid on contracts for three years.

END OF DOCUMENT

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DOCUMENT 00 45 27

WORKER'S COMPENSATION INSURANCE CERTIFICATE

To: City of Lafayette

1. Contractor:

I am aware of the provisions of Section 3700 of the Labor Code of the State of California, which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the Work of this Contract.

Signed this _____ day of _____, 21.

Name of Firm

Corporate Seal:

Signature 21
Date

Title

2. Insurer:

- a. There is in existence a valid policy of workers' compensation insurance in a form approved by the Insurance Commissioner for the above-named Insured. The full deposit premium on the policy has been paid.
- b. The coverage afforded Insured is in accordance with the Workers' Compensation Law of California and complies with statutory limits.
- c. The expiration date of the policy is _____.
- d. At least ten days' advance written notice will be given to the City by the undersigned in the event of cancellation of the policy. Notice is to be given to: **City of Lafayette, 3675 Mt. Diablo Boulevard, Suite 210, Lafayette, CA 94549**

Signed this _____ day of _____, 21

Name of Firm

Corporate Seal:

Signature 21
Date

Title

END OF DOCUMENT

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DOCUMENT 00 51 00

NOTICE OF AWARD

Date: _____

TO: _____
ADDRESS: _____
PROJECT: _____

The Contract Price of your contract is _____ Dollars,
(\$_____).

You must deliver to the City the following within ten (10) calendar days of the date of this Notice of Award. That is, by _____.

1. Two fully executed counterparts of Document 00 52 10, "Agreement".
2. Document 00 61 14, "Construction Performance Bond", and Document 00 61 27, "Construction Labor and Material Payment Bond", executed by you and your surety.
3. Insurance certificates required under Document 00 73 15, "Insurance".
4. Document 00 65 37, "Guaranty", executed by you.
5. Evidence received or generated by you in preparation of bid prices for this contract, as set forth in Document 00 67 00, "Escrow Bid Documents".
6. Schedule of Values as specified in 1.07.B of Section 01 22 10.
7. Information related to the qualified CPM scheduler proposed for this project, as set forth in Document 01 32 10, "Progress Schedules and Reports".

Failure to comply with these conditions within the time specified will entitle City to consider your bid abandoned, to annul this Notice of Award, and to declare your Bid Security forfeited. Within ten (10) calendar days after you comply with these conditions, the City will return to you one fully signed counterpart of the Agreement.

City of Lafayette
A California Municipal Corporation

By: _____

Title: _____

END OF DOCUMENT

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DOCUMENT 00 52 10

AGREEMENT

THIS AGREEMENT is made this ____ day of _____, 21____, by and between (Name) _____, ("Contractor"), whose place of business is located at (Address) _____ and City of Lafayette, a California Municipal Corporation ("City") acting under and by virtue of the authority vested in the City by the laws of the State of California.

WHEREAS, the City of Lafayette by its action on the ____ day of _____ awarded to Contractor the following contract: **Lafayette Community Center Restroom Renovation.**

WHEREAS, Contractor has obtained, and delivers concurrently herewith, Performance and Labor and Material Payment Bonds and evidence of insurance coverage as required by the Contract.

NOW, THEREFORE, in consideration of the mutual covenants hereinafter set forth, Contractor and City agree as follows:

Article 1. Work

1.1 Contractor shall complete all Work specified in the Contract Documents, in accord with the Plans, Specifications, and all other terms and conditions of the Contract Documents. Contractor shall perform all Work under the Contract Documents with the highest skill and in a professional and workmanlike manner. Contractor represents and maintains that it is skilled and capable to perform the Work. Contractor warrants that all employees and subcontractors shall have sufficient skill and experience to perform the Work assigned to them. Finally, Contractor further represents that it, its employees and subcontractors have all licenses, permits, qualifications and approvals of whatever nature that are legally required to perform the Work, and that such licenses and approvals shall be maintained throughout the term of this Contract.

Article 2. Project Manager

2.1 City has designated the City Engineer, or his designee, as "Project Manager" (also referred to as "Engineer") in the Contract Documents. City may change the individual acting as Engineer at any time with notice and without liability to Contractor.

Article 3. Contract Time and Liquidated Damages

3.1 Contract Time. Contractor shall commence Work under this Contract on the Site on the date when Contract Times commence to run as provided in Document 00 72 00, "General Conditions." City reserves the right to modify or alter the Commencement Date of the work due to the need to complete other City provided work at the Site without limitation. The Work shall be completed finally and in its entirety within **sixty (60) working days** from the date when the Contract Time commences to run as provided in Document 00 72 00, "General Conditions." Contractor shall perform its Work in strict accordance with any completion schedule, construction schedule or project milestones developed pursuant to provisions of the Contract.

3.2 Liquidated Damages. City and Contractor recognize that time is of the essence of this Agreement and that City will suffer financial loss if Work is not completed within the Contract Time specified above, plus any extensions thereof allowed in accordance with the Contract Documents. The provisions of Section 8-10 "Liquidated Damages" of the General Provisions of the City of Lafayette Standard Specifications shall apply in its entirety and as supplemented in other related sections of these Project Specifications.

**LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION
500 ST. MARYS ROAD
LAFAYETTE, CA 94549**

Article 4. Contract Price

- 4.1 Contractor promises and agrees, as its own cost and expense, to furnish to the City all labor, materials, tools, equipment, services and incidental and customary work for the construction of **City of Lafayette Project No. 012-9180** necessary to fully and adequately complete the **Lafayette Community Center Restroom Renovation**, including any alternatives selected by the City, and all structures and facilities described in the Contract ("Work"), for a total of _____ DOLLARS and _____ CENTS (\$ _____), as specified in the Contract Documents submitted by the Contractor in response to the Notice Inviting Bids. Such amount shall be subject to adjustment in accordance with the applicable terms of this Contract. All Work shall be subject to, and performed in accordance with the above referenced documents.

Article 5. Contractor's Representations

In order to induce City to enter into this Agreement, Contractor makes the following representations and warranties:

- 5.1 Contractor has visited the Site and has examined thoroughly and understood the nature and extent of the Contract Documents, Work, Site, locality, actual conditions, as-built conditions of the Site, and all local conditions, and federal, state and local laws and regulations that in any manner may affect cost, progress, performance or furnishing of Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Contractor and safety precautions and programs incident thereto.
- 5.2 Contractor has conducted or obtained all examinations, investigations, explorations, tests, studies, and data concerning surface and subsurface conditions and facilities at or contiguous to the site, which it deems necessary to determine its Bid for and total cost to perform the Work, and has correlated its knowledge and the results of all such examinations, investigations, explorations, tests, studies and data with the terms and conditions of the Contract Documents.
- 5.3 Contractor has given City prompt written notice of all conflicts, errors, ambiguities or discrepancies that it has discovered in or among the Contract Documents and as-built and actual conditions and the written resolution thereof through Addenda issued by City is acceptable to Contractor.
- 5.4 Contractor is duly organized, existing and in good standing under applicable state law, and is duly qualified to conduct business in the state of California.
- 5.5 Contractor has duly authorized the execution, delivery and performance of this Agreement, the other Contract Documents and the Work to be performed herein. The Contract Documents do not violate or create a default under any instrument, agreement, order or decree binding on Contractor.

Article 6. Contract Documents

- 6.1 The Contract Documents for the project shall consist of the Notice Inviting Bids, the Instruction to Bidders, the Bid, the Plans, Project Specifications, reference standards and specifications, and any appendices; together with this Contract Agreement and all required bonds, insurance certificates, permits, notices and affidavits; and also including any and all exhibits, drawings, specifications, addenda or supplemental agreements clarifying, amending, or extending the work contemplated as may be required to insure its completion in an acceptable manner. All of the provisions of said Contract Documents are made a part hereof as though fully set forth herein.

The above documents are an integral part of the Contract Documents. By signing this Contract, Contractor acknowledges that he or she has read, understood and agrees with all of the terms of the Contract Documents. Contractor shall not disclaim knowledge of the meaning and effect of any term or provision of the Contract Documents, and agrees to strictly abide by their meaning

**LAFAYETTE COMMUNITY CENTER RESTROOM RENOVATION
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and intent.

- 6.2 There are no Contract Documents other than those described above in this Article 6. Document 00 32 00, "Existing Conditions," and the information supplied therein are not Contract Documents. The Contract Documents may only be amended, modified or supplemented as provided in Document 00 72 00, "General Conditions."

Article 7. Miscellaneous

- 7.1 Any undefined terms used in this Agreement will have the meaning indicated in Specifications Section 01 42 10.
- 7.2 It is understood and agreed that in no instance are the persons signing this Agreement for or on behalf of City or acting as an employee or representative of City, liable on this Agreement or any of the Contract Documents, or upon any warranty of authority, or otherwise, and it is further understood and agreed that liability of the City is limited and confined to such liability as authorized or imposed by the Contract Documents or applicable law.
- 7.3 In entering into a public works contract or a sub-contract to supply goods, services or materials pursuant to a public works contract, Contractor or subcontractor offers and agrees to assign to the awarding body all rights, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. § 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services or materials pursuant to the public works contract or the sub-contract. This assignment shall be made and become effective at the time City tenders final payment to Contractor, without further acknowledgment by the parties.
- 7.4 Contractor shall be required to pay the prevailing rate of wages in accordance with the Labor Code. Such rates are available at the City offices or online at <http://www.dir.ca.gov/dlsr>, and must be posted at the job site. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the State of California Department of Industrial Relations, are deemed included in the Contract Documents. Pursuant to Section 1861 of the Labor Code, Contractor represents that it is aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of that Code, and Contractor shall comply with such provisions before commencing the performance of the Work of the Contract Documents.
- 7.5 Should any part, term or provision of this Agreement or any of the Contract Documents, or any document required herein or therein to be executed or delivered, be declared invalid, void or unenforceable, all remaining parts, terms and provisions shall remain in full force and effect and shall in no way be invalidated, impaired or affected thereby. If the provisions of any law causing such invalidity, illegality or unenforceability may be waived, they are hereby waived to the end that this Agreement and the Contract Documents may be deemed valid and binding agreements, enforceable in accordance with their terms to the greatest extent permitted by applicable law.
- 7.6 This Agreement and the Contract Documents shall be deemed to have been entered into in the City of Lafayette, Contra Costa County, State of California, and governed in all respects by California law (excluding choice of law rules). The exclusive venue for all disputes or litigation hereunder shall be in the County of Contra Costa. Both parties hereby waive their rights under California Code of Civil Procedure Section 394 to file a motion to transfer any action or proceeding arising out of this contract for the construction of the Project. If, for any reason, the Parties' choice of Contra Costa County as the exclusive venue as set forth herein is held void or unenforceable by a court of competent jurisdiction, or otherwise found invalid, the venue for all suits or litigation hereunder shall be in the County of Alameda, State of California.

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- 7.7 In accordance with Section 9201 of the Public Contract Code, City shall provide Contractor with timely notification of the receipt of any third-party claims, relating to the Contract. The City shall recover its reasonable costs incurred in providing Contractor with notification of the third-party claims.
- 7.8 City agrees to engage and does hereby engage Contractor as an independent contractor to furnish all materials and to perform all Work according to the terms and conditions herein contained for the sum set forth above.
- 7.9 If either party commences an action against the other party, either legal, administrative or otherwise, arising out of or in connection with this Contract, the prevailing party in such action shall be entitled to have and recover from the losing party reasonable attorneys' fees and all other costs of such action.
- 7.10 The parties do for themselves, their heirs, executors, administrators, successors, and assigns agree to the full performance of all of the provisions contained in this Contractor. Contractor may not either voluntarily or by action of law, assign any obligation assumed by Contractor hereunder without the prior written consent of the City.
- 7.11 All notices hereunder and communications regarding interpretation of the terms of the Agreement or changes thereto shall be provided by the mailing thereof by registered or certified mail, return receipt requested, postage prepaid and addressed as follows:

Contractor

Attn: _____

Surety

Attn: _____

City

City of Lafayette
3675 Mt. Diablo Blvd. #210
Lafayette, CA 94549-1968

Any notice so given shall be considered received by the other party three (3) days after deposit in the U.S. Mail, first class postage prepaid, addressed to the party at the above address. Actual notice shall be deemed adequate notice on the date actual notice occurred, regardless of the method of service.

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IN WITNESS WHEREOF the parties have executed this Agreement in the day and year first above written.

CONTRACTOR: _____
(Name of Firm)

Signature

Title (If Corporation: Chairman, President or Vice President)

Signature

Title (If Corporation: Secretary, Assistant Secretary, Chief Financial Officer or Assistant Treasurer)

CITY: CITY OF LAFAYETTE, a California Municipal Corporation

City Manager

ATTEST:

City Clerk

END OF DOCUMENT

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DOCUMENT 00 55 00

NOTICE TO PROCEED

Date: _____

To: _____

Address: _____

Project: _____

You are notified that the Contract Time under the above contract will commence to run on _____ . By that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 3 of Document 00 52 10 Agreement, the date of final completion is _____ .

Before you may start any Work at the site, you must: (conditions if applicable)

CITY OF LAFAYETTE
A California Municipal Corporation

By : _____

Title: _____

END OF DOCUMENT

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DOCUMENT 00 61 14

CONSTRUCTION PERFORMANCE BOND

WHEREAS City of Lafayette, "City" (also herein "Obligee"), has awarded to _____ (hereinafter "Contractor"), a contract for work consisting of but not limited to, furnishing all labor, materials, tools, equipment, services, and incidentals for the construction of the **City of Lafayette Project No. 012-9180, Lafayette Community Center Restroom Renovation** in the City of Lafayette, California 94549, and all associated structures and facilities; and

WHEREAS, the Work to be performed by the Contractor is more particularly set forth in that certain contract for said Work dated _____ (hereinafter the "Contract"), hereby incorporated by reference; and

WHEREAS, the Contractor is required by said Contract to perform the terms thereof and to provide a bond both for the performance and guaranty thereof;

NOW, THEREFORE, we _____, the undersigned Contractor, as Principal, and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto City of Lafayette in the sum of _____ dollars, \$ _____, said sum being not less than 100% of the total amount payable by the said Obligee under the terms of the said Contract, for which payment well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if Contractor, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the said Contract and any alteration thereof made as therein provided, on his or their part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill all obligations under the Contract; and indemnify and save harmless the Obligee, its officers and agents, as stipulated in the said Contract, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect. In the event legal action is required to enforce the provisions of this agreement, the prevailing party shall be entitled to recover reasonable attorneys' fees in addition to court costs, necessary disbursements, and other damages.

As a condition precedent to the satisfactory completion of the Contract, unless otherwise provided for therein, the above obligation shall hold good until all duties and obligations under the Contract are fully and faithfully performed, during which time, if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the Obligee from loss or damage resulting from or caused by defective materials or faulty workmanship, the obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the Obligee's rights or Contractor's or Surety's obligations under the Contract, law, or equity, including but not limited to California Code of Civil Procedure Section 337.15.

Whenever Contractor shall be, and is declared by Obligee to be, in default under the Contract Documents, the Surety shall remedy the default pursuant to the Contract Documents, or at Obligee's option, shall promptly do one of the following:

1. Take over and complete the Project in accordance with all terms and conditions in the Contract Documents.
2. Obtain a bid or bids for completing the Project in accordance with all terms and conditions in the Contract Documents; and upon determination by Surety of the lowest responsive and

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responsible bidder, arrange for a Contract between such bidder, the Surety, and the Oblige, and make available sufficient funds as work progresses to pay the cost of completion of the Project, less the balance of the Contract Price, including other costs and damages for which Surety may be liable. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor by the Oblige under the Contract and any modification thereto, less any amount previously paid by the Oblige to Contractor and any other offsets pursuant to the Contract Documents.

3. Permit the Oblige to complete the Project in any manner consistent with California law and make available sufficient funds as work progresses to pay the cost of completion of the Project, less the balance of the Contract Price, including other costs and damages for which Surety may be liable. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor by the Oblige under the Contract and any modification thereto, less any amount previously paid by the Oblige to Contractor and any other offsets pursuant to the Contract Documents.

Surety expressly agrees that Oblige may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by Contractor. Surety shall not utilize Contractor in completing the Project, nor shall Surety accept a bid from Contractor for completion of the Project, without Oblige's express prior written consent, which may be withheld at Oblige's sole discretion.

The said Surety, for value received, hereby stipulates and agrees that no change, extensions of time, alteration or addition to the terms of the Contract or to the Work to be performed thereunder, or the specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or to the Work or to Specifications.

IN WITNESS WHEREOF, we have hereto set our hands and seals this ____ day of _____, 20____.

Contractor

By: _____
President

Surety

By: _____
Attorney-in-Fact

The rate of premium on this bond is _____ per thousand.
The total amount of premium charged, \$_____.
(The above must be filled in by corporate surety.)

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DOCUMENT 00 61 27

CONSTRUCTION LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS That

WHEREAS, the City of Lafayette (hereinafter designated as the "City"), by action taken or a resolution passed _____, ___21 has awarded to _____ hereinafter designated as the "Principal," a contract for the work consisting of, but not limited to, furnishing all labor, materials, tools, equipment, services, and incidentals for the construction of the **City of Lafayette Project No. 012-9180, Lafayette Community Center Restroom Renovation**, in the City of Lafayette, California, and all associated structures and facilities, (the "Project"); and

WHEREAS, the work to be performed by the Principal is more particularly set forth in the Contract Documents for the Project dated _____ ("Contract Documents"), the terms and conditions of which are expressly incorporated by reference; and

WHEREAS, said Principal is required to furnish a bond in connection with said contract; providing that if said Principal or any of its Subcontractors shall fail to pay for any materials, provisions, provender, equipment, or other supplies used in, upon, for or about the performance of the work contracted to be done, or for any work or labor done thereon of any kind, or for amounts due under the Unemployment Insurance Code or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of said Principal and its Subcontractors with respect to such work or labor the Surety on this bond will pay for the same to the extent hereinafter set forth.

NOW THEREFORE, we, the Principal and _____ as Surety, are held and firmly bound unto the City in the penal sum of _____ Dollars (\$ _____) lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, his or its subcontractors, heirs, executors, administrators, successors or assigns, shall fail to pay any of the persons named in Section 9100 of the Civil Code, fail to pay for any materials, provisions or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the contract, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department or Franchise Tax Board from the wages of employees of the contractor and his subcontractors pursuant to Section 18663 of the Revenue and Taxation Code, with respect to such work and labor the Surety or Sureties will pay for the same, in an amount not exceeding the sum herein above specified.

This bond shall inure to the benefit of any of the persons named in Section 9100 of the Civil Code so as to give a right of action to such persons or their assigns in any suit brought upon this bond.

It is further stipulated and agreed that the Surety on this bond shall not be exonerated or released from the obligation of this bond by any change, extension of time for performance, addition, alteration or modification in, to, or of any contract, plans, specifications, or agreement pertaining or relating to any scheme or work of improvement herein above described, or pertaining or relating to the furnishing of labor, materials, or equipment therefore, nor by any change or modification of any terms of payment or extension of the time for any payment pertaining or relating to any scheme or work of improvement herein above described, nor by any rescission or attempted rescission of the contract, agreement or bond, nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond and that this bond be construed most strongly against the Surety and

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CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the corporation named as principal to the within bond; that _____ who signed said bond on behalf of the principal was then _____ of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed and attested for and in behalf of said corporation by authority of its governing Board.

(Corporate Seal)

Signature Date

NOTE: A copy of the power of attorney to local representatives of the bonding company may be attached hereto.

END OF DOCUMENT

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DOCUMENT 00 65 10

AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS

THIS AGREEMENT is made this ____ day of _____, ____21, by and between (Name) _____, ("Contractor"), whose place of business is located at (Address) _____ and City of Lafayette, a California Municipal Corporation, ("City"), acting under and by virtue of the authority vested in the City by the laws of the State of California.

RECITALS

City and Contractor entered into Contract for: **City of Lafayette Project No. 012-9180, Lafayette Community Center Restroom Renovation.** The Work under the foregoing Contract has been completed.

Now, therefore, it is mutually agreed between City and Contractor as follows:

AGREEMENT

1. Contractor will not be assessed liquidated damages except as detailed below:

Original Contract Sum	\$	
Modified Contract Sum	\$	
Payment to Date	\$	
Liquidated Damages	\$	
Payment Due Contractor	\$	

2. Subject to the provisions of this Agreement and Release, City shall forthwith pay to Contractor the sum of _____ Dollars (\$ _____) under the above Contract, less any amounts withheld under the Contract or represented by any Notice to Withhold Funds on file with City as of the date of such payment.

3. Contractor acknowledges and hereby agrees that there are no unresolved or outstanding claims in dispute against City arising from the above Contract, except for the claims described in Paragraph 4. It is the intention of the parties in executing this Agreement and Release that this Agreement and Release shall be effective as a full, final and general release of all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities of Contractor against City, all its respective agents, employees, inspectors, assignees and transferees except for the Disputed Claims set forth in Paragraph 4. Nothing in this Agreement and Release shall limit or modify Contractor's continuing obligations described in Paragraph 6, below.

4. The following claims are disputed ("Disputed Claims") and are specifically excluded from the operation of this Agreement and Release: [

Claim No.	Date Submitted	Description of Claim	Amount of Claim

5. Consistent with California Civil Code Section 8138, the statutory form for Unconditional Waiver and Release Upon Final Payment has been executed and attached hereto.

6. Guarantees and warranties for the Work, and any other continuing obligation of Contractor, shall remain in full force and effect as specified in the Contract Documents.

7. Contractor shall immediately defend, indemnify and hold harmless City, all its respective agents, employees, inspectors, assignees and transferees from any and all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities that may be asserted against them by any of Contractor's suppliers and/or subcontractors of any tier and/or any suppliers

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to them for any and all labor, materials, supplies and equipment used, or contemplated to be used in the performance of Contract, except for the Disputed Claims set forth in Paragraph 4, above.

8. Contractor hereby waives the provisions of California Civil Code Section 1542 which provides as follows: *"A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor."*
9. The provisions of this Agreement and Release are contractual in nature and not mere recitals and shall be considered independent and severable, and if any such provision or any part thereof shall be at any time held invalid in whole or in part under any federal, state, county, municipal or other law, ruling or regulations, then such provision, or part thereof shall remain in force and effect only to the extent permitted by law, and the remaining provisions of this Agreement and Release shall also remain in full force and effect, and shall be enforceable.
10. Contractor represents and warrants that it is the true and lawful owner of all claims and other matters released pursuant to this Agreement and Release, and that it has full right, title and authority to enter into this instrument. Each party represents and warrants that it has been represented by counsel of its own choosing in connection with this Agreement and Release.
11. All rights of City shall survive completion of the Work or termination of Contract, and execution of this Agreement and Release.

IN WITNESS WHEREOF the parties have executed this Agreement in the date first written above.

CONTRACTOR: _____
(Name of Firm)

Signature

Title (If Corporation: Chairman, President or Vice President)

Signature

Title (If Corporation: Secretary, Assistant Secretary, Chief Financial Officer or Assistant Treasurer)

CITY: CITY OF LAFAYETTE

City Manager

ATTEST:

City Clerk

APPROVED AS TO FORM:

City Attorney

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UNCONDITIONAL WAIVER AND RELEASE UPON FINAL PAYMENT

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect the following:

Disputed Claims for extras in the amount of \$ _____

Signature

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

END OF DOCUMENT

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DOCUMENT 00 65 37

GUARANTY

TO CITY OF LAFAYETTE, for the Lafayette Community Center Restroom Renovation, 500 St. Marys Road, in Lafayette, CA 94549.

The undersigned guarantees all construction performed on this project and also guarantees all material and equipment incorporated therein. Contractor hereby grants to City for a period of one (1) year following the date of Final Acceptance of the Work by the Lafayette City Council, or such longer period specified in the Contract Documents, its unconditional warranty of the quality and adequacy of all of the Work including, without limitation, all labor, materials and equipment provided by Contractor and its Subcontractors of all tiers in connection with the Work.

Neither final payment nor use or occupancy of the Work performed by the Contractor shall constitute an acceptance of work not done in accordance with this Guaranty or relieve Contractor of liability with respect to any express warranties or responsibilities for faulty materials or workmanship. Even though equipment, materials, or any part of the Work required to be provided under the Contract Documents may have been inspected, accepted, and estimated for payment, such action by City shall not relieve Contractor of any of its obligations under the Contract Documents

Should any defect be discovered, or the Work, in whole or in part, be defective due to faulty workmanship, material furnished or methods of installation, or should the Work or any part thereof fail to operate properly as originally intended and in accordance with the Contract Documents due to any of the above causes within one (1) year after date of acceptance, or such longer period specified in the Contract Documents, Contractor shall: (1) upon demand by City, replace any such material and to immediately repair said Work completely without cost to City so that said Work will function successfully as originally contemplated, or (2) reimburse City, upon demand, for its expenses incurred in replacing or repairing said Work to the condition contemplated in the Contract Documents, including the cost of any such equipment or materials replaced and the cost of removing and replacing any other work necessary to make such replacement or repairs.

Contractor shall make promptly remedy the defect at its own cost within a reasonable period of time upon notification by City; provided, however, that in no event shall such period exceed twenty (20) calendar days from the notice.

All definition of terms used in this Agreement shall have the meanings set forth in the Contract Documents, including, without means of limitation, Document 01 42 10, "References and Definitions."

The foregoing Guaranty is in addition to any other warranties by Contractor contained in the Contract Documents, and not in lieu of, any and all other liability imposed on Contractor under the Contract Documents and by law with respect to Contractor's duties, obligations, and performance under the Contract Documents. In the event of any conflict or inconsistency between the terms of this Guaranty and any warranty or obligation of the Contractor under the Contract Documents or by law, such inconsistency or conflict shall be resolved in favor of the higher level of obligation of the Contractor.

CONTRACTOR:

Corporate Seal:

Name of Firm

Signature

Date

Signature

Date

Title

Title

END OF DOCUMENT

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DOCUMENT 00 67 00

ESCROW BID DOCUMENTS

1. Requirements for Escrow Bid Documents.
 - a. Within fourteen (14) calendar days after the date Contract is awarded, Contractor shall submit to City a set of Escrow Bid Documents as defined in section 2, below. Escrow Bid Documents will be used only in the manner and for the purposes described in this Document 00 67 00.
 - b. Should Contractor fail to make the submission within the allowed time specified, Contractor may be deemed to have failed to enter into the Contract, Contractor shall forfeit the amount of its bid security accompanying Contractor's bid, and City may award the Contract to the next lowest responsive and responsible bidder. Alternatively, City will make no payments until the documents are submitted and approved.

2. Scope of Escrow Bid Documents.
 - a. Contractor shall submit one copy of all documentary information used by Contractor in preparation of bid prices for the Contract Documents, as specified in Paragraphs 5 and 6 of this Document 00 67 00. Contractor's Escrow Bid Documents will be held in escrow as provided in this Document 00 67 00.
 - b. Contractor represents and agrees that the Escrow Bid Documents constitute all written information used in the preparation of its bid. Contractor further represents and agrees that in connection with any resulting charges, claims, disputes, and legal proceedings, Contractor may not introduce or rely on any other written bid preparation information regarding the formulation of its Bid. Contractor also agrees that nothing in the Escrow Bid Documents shall change or modify the terms or conditions of the Contract Documents or render any of the Escrow Bid Documents admissible as evidence in any subsequent legal proceedings. Contractor is advised that the Escrow Bid Documents will only be used as a guide in the resolution of charges, disputes, and claims.

3. Ownership of Escrow Bid Documents.
 - a. The Escrow Bid Documents are, and shall always remain, the property of Contractor, subject to review by City, as provided in this Document 00 67 00.
 - b. If Contractor contends that any Escrow Bid Documents constitute or include trade secrets, Contractor shall so designate each such document as such on its face. City agrees to safeguard such designated Escrow Bid Documents against disclosure, and agrees that it will not disclose any Escrow Bid Documents designated as trade secret without providing Contractor advanced notice and a reasonable opportunity to obtain a protective order with respect to any such documents.

4. Escrow Bid Documents may be used in the determination of price adjustments and change orders and in the settlement of disputes and claims. If used in legal proceedings, Escrow Bid Documents shall be subject to an appropriate protective order limiting their disclosure.

5. Format and Contents of Escrow Bid Documents.
 - a. Contractor shall submit Escrow Bid Documents in their native electronic format as well as in any usual cost-estimating format; a standard format is not required as long as the documents are legible, clear, and reasonably self-explanatory. Contractor shall prepare and submit the Escrow Bid Documents in English.
 - b. City requires Contractor to clearly itemize in the Escrow Bid Documents the estimated costs of performing the work of each bid item contained in the bid schedule, or each major component and system of the project. Contractor should separate bid items into sub-items as required to present a detailed cost estimate and allow a detailed cost review. The Escrow Bid Documents shall include all subcontractor bids or quotes, supplier bids or quotes, quantity take-offs, crews,

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equipment, calculations of rates of production and progress, copies of quotes from subcontractors and suppliers, and memoranda, narratives, add/deduct sheets, and all other information used by Contractor to arrive at the prices contained in the bid. Escrow Bid Documents shall include costs of scheduled maintenance, depreciation, fleet rental expense discounts and incentives, and similar cost adjustments if used by Contractor to calculate its bid prices. Estimated costs should be broken down into Contractor's usual estimate categories such as direct labor, repair labor, equipment ownership and operation, expendable materials, permanent materials and subcontract costs and mark-ups as appropriate. Plant and equipment and indirect costs should be detailed in Contractor's usual format. Contractor shall identify its allocation of overhead, indirect costs, contingencies, markup and other items to each bid item.

- c. Contractor shall identify all costs. For work items amounting to less than Ten Thousand Dollars (\$10,000), Contractor may estimate costs without a detailed estimate, provided that Contractor includes applicable labor, equipment, materials and subcontracts, and allocates applicable indirect costs, contingencies and markup.

6. Submittal of Escrow Bid Documents.

- a. The submittal shall be clearly marked on the outside with Contractor's name, date of submittal, project name and the words "Escrow Bid Documents". City will review the Escrow Bid Documents for initial compliance. City has three (3) days after receipt of Bidder's Escrow Bid Documents to demand additional information.
- b. By submitting Escrow Bid Documents, Contractor represents that the material in the Escrow Bid Documents constitutes all the documentary information used in preparation of the bid and that Contractor has personally examined the contents of the Escrow Bid Documents and has found that the documents are complete.
- c. If Contractor's proposal is based upon subcontracting any part of the work, each subcontractor whose total subcontract price exceeds five percent (5%) of the total contract price proposed by Contractor, shall provide separate Escrow Documents to be included with those of Contractor. Such documents shall be opened and examined in the same manner and at the same time as the examination described above for Contractor.
- d. If Contractor wishes to subcontract any portion of the work after award, City retains the right to require Contractor to submit Escrow Documents for the subcontractor before approval of the subcontract.

7. Storage, Examination and Final Disposition of Escrow Bid Documents.

- a. The Escrow Bid Documents will be stored in a safe until final completion of work on the Project and full and final resolution of all claims relating thereto, at a mutually agreeable institution within the city limits of the project site. Contractor will pay the cost of storage (if any) for the Escrow Bid Documents until that time.
- b. After the initial review by the City, City and Contractor shall examine the Escrow Bid Documents at any time deemed necessary by either party, to assist in the negotiation of price adjustments, change orders, or the settlement of disputes and claims. Examination of the Escrow Bid Documents is subject to the following:
 - i. As trade secrets, the Escrow Bid Documents are proprietary and confidential under section 3.b. above.
 - ii. City and Contractor (and any subcontractor, to the extent Escrow Bid Documents are required by a subcontractor) shall each designate in writing to the other party two (2) days prior to any examination, representatives who are authorized to examine the Escrow Bid Documents. Except as otherwise provided in a court order, no other person shall have access to the Escrow Documents.
 - iii. Except as otherwise provided in a court order, access to the documents may take place only in the presence of duly designated representatives of both City and Contractor. If Contractor fails to designate a representative or appear for joint

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examination on two (2) days' notice, then City representative may examine the Escrow Bid Documents.

- iv. Following final completion of work on the Project and achievement of final settlement, City shall return those documents to Contractor.

END OF DOCUMENT

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DOCUMENT 00 68 00

**ESCROW AGREEMENT FOR
SECURITY DEPOSITS IN LIEU OF RETENTION**

THIS ESCROW AGREEMENT ("Escrow Agreement") is made and entered into on _____, ____21, by and between City of Lafayette, a California Municipal Corporation, ("City"), and _____, ("Contractor"), and _____; a state or federally chartered bank in the state of California, ("Escrow Agent").

For the consideration hereinafter set forth, City, Contractor and Escrow Agent agree as follows:

1. Pursuant to Section 22300 of Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by City pursuant to the Construction **Contract No. 012-9180**, entered into between City and Contractor for the **Lafayette Community Center Restroom Renovation**, in the amount of _____ dated _____, 20____ (the "Contract"). Alternatively, on written request of Contractor, City shall make payments of the retention earnings directly to Escrow Agent. When Contractor deposits the securities as a substitute for Contract earnings, Escrow Agent shall notify City within ten (10) calendar days of the deposit. The market value of the securities at the time of substitution shall be at least equal to the cash amount then required to be withheld as retention under terms of Contract between City and Contractor. Securities shall be held in name of City and shall designate Contractor as the beneficial owner.
2. City shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments pursuant to Contract provisions, provided that Escrow Agent holds securities in form and amount specified above.
3. When City makes payment of retention earned directly to Escrow Agent, Escrow Agent shall hold them for the benefit of Contractor until the time that the escrow created under this Escrow Agreement is terminated. Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the Parties shall be equally applicable and binding when City pays Escrow Agent directly.
4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account, and all expenses of City. Such expenses and payment terms shall be determined by City, Contractor and Escrow Agent.
5. Interest earned on securities held in escrow and all interest earned on that interest shall be for sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to City.
6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from City to Escrow Agent that City consents to withdrawal of amount sought to be withdrawn by Contractor.
7. City shall have the right to draw upon the securities in event of default by Contractor. Upon written notice to Escrow Agent from City of the default, Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by City.
8. Upon receipt of written notification from City certifying that the Contract is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all

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monies and securities on deposit and payments of fees and charges.

9. Escrow Agent shall rely on written notifications from City and Contractor pursuant to Paragraphs 5 through 8, inclusive, of this Escrow Agreement and City and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of securities and interest as set forth above.
10. Names of persons who are authorized to give written notice or to receive written notice on behalf of City and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

On behalf of City:

On behalf of Contractor:

Title

Title

Name

Name

Signature

Signature

On behalf of Escrow Agent:

Title

Name

Signature

At the time the Escrow Account is opened, City and Contractor shall deliver to Escrow Agent a fully executed counterpart of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

CONTRACTOR: _____
(Name of Firm)

Signature

Title (If Corporation: Chairman, President or Vice President)

Signature

Title (If Corporation: Secretary, Assistant Secretary, Chief Financial Officer or Assistant Treasurer)

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CITY: CITY OF LAFAYETTE

City Manager

ATTEST:

City Clerk

APPROVED AS TO FORM:

City Attorney

ESCROW AGENT:

Signature

Name

Title

END OF DOCUMENT

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DOCUMENT 00 72 00

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PART 1. GENERAL

A. DOCUMENTS

1. Contract Documents are complementary; what is called for by one is as binding as if called for by all. Contract Documents shall not be construed to create a contractual relationship of any kind between (1) Architect and Contractor; (2) City and/or its representatives and a subcontractor, sub-sub-contractor or supplier of any Project labor, materials or equipment; or (3) between any persons or entities other than City and Contractor. City shall be deemed to be an intended third-party beneficiary of each agreement referenced in clause (2) above, and each such agreement shall so provide. Contractor is fully responsible for Contractor's own acts and omissions. Contractor is responsible for all acts and omissions of its subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work, labor, materials or equipment under a direct or indirect contract with Contractor.

B. EXERCISE OF CONTRACT RESPONSIBILITIES

1. In exercising its responsibilities and authorities under Contract Documents, City does not assume any duties or responsibilities to any subcontractor or supplier and does not assume any duty of care to Contractor, Contractor's subcontractors or suppliers.

- C. DEFINED TERMS.** All definitions of terms used and not otherwise defined in these General Conditions are set forth in Specifications Section 01 42 10, "References and Definitions."

PART 2. BIDDING

A. INVESTIGATION PRIOR TO BIDDING

1. Prior to bidding, Bidders must perform the work, investigations, research and analysis required by Article 5 of Document 00 52 10, "Agreement." Under Contract Documents, Contractor is charged with all information and knowledge that a reasonable bidder would ascertain from having performed the required work, investigations, research and analysis. Bid prices must include entire cost of all work incidental to completion of the contract, as that term is defined in Part 5 of this Document 00 72 00.

B. SUBCONTRACTORS

1. Contractor shall not substitute any other person or firm in place of any subcontractor listed in the Bid, except in accordance with Public Contract Code Sections 4101 et seq. Subcontractors shall not assign or transfer their subcontracts or permit them to be performed by any other contractor without City's written approval. At City's request, Contractor shall provide City with a complete copy of all executed subcontracts or final commercial agreements with subcontractors and/or suppliers.
2. Subcontract agreements must preserve and protect the rights of City under Contract Documents so that subcontracting will not prejudice such rights. To the extent of the work to be performed by a subcontractor, Contractor must require the subcontractor's written agreement (1) to be bound to the terms of Contract Documents and (2) to assume vis-à-vis Contractor all the obligations and responsibilities that Contractor assumes toward City under Contract Documents. Contractor must provide for the assignment of all rights any subcontractor may have against any manufacturer, supplier, or distributor for breach of warranties and guarantees relating to the work performed by the subcontractor under Contract Documents.
3. In accordance with the provisions of the Labor Code, contractors or subcontractors may not perform work on a public works project with a subcontractor who is ineligible to perform work

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on a public project pursuant to Section 1777.1 or Section 1777.7 of the Code. Any contract on a public works project entered into between a contractor and an unlicensed or debarred subcontractor is void as a matter of law. An unlicensed or debarred subcontractor may not receive any public money for performing work as a subcontractor on a public works contract. Any public money that is paid to an unlicensed or debarred subcontractor by Contractor for the Project shall be returned to City. Contractor shall be responsible for the payment of wages to workers of an unlicensed or debarred subcontractor who has been allowed to work on the Project.

PART 3. CONTRACT AWARD AND COMMENCEMENT OF THE WORK

A. AWARD OF CONTRACT

1. Section 3-1 of the General Provisions of the Standards Specifications shall apply.
2. Apparent Low Bidder must execute and submit the following documents to City by 5 p.m. of the tenth (10th) calendar day following NOTICE OF AWARD. Apparent Low Bidder's failure to submit these documents properly and timely entitles City to reject the Bid as non-responsive, foreclose on bid security, and proceed to the next low, responsible, responsive bidder.
 - a. Document 00 52 10, "Agreement," executed by Bidder. Submit two (2) copies, each bearing an original signature.
 - b. Document 00 61 14, "Construction Performance Bond" and Document 00 61 27, "Construction Labor and Material Payment Bond," executed by Bidder and surety.
 - c. Insurance Certificates and Endorsements required by Document 00 73 15, "Insurance."
 - d. Documentary information received or generated by Bidder in preparation of Bid prices for its Bid, as set forth in Document 00 67 00, "Escrow Bid Documents."
 - e. The Guaranty in the form set forth in Document 00 65 37, "Guaranty."
 - f. Schedule of Values as specified in Division 01 Section 01 22 10.
3. City shall have the right to communicate directly with Apparent Low Bidder's proposed performance and labor and material payment bond surety, to confirm the performance bond. City may elect in its sole discretion to extend the time to receive faithful performance and labor and material bonds.
4. City will furnish one reproducible set of contract plans and specifications. Production of additional sets for the Contractor's needs shall be at his expense.
5. City is not obligated to award Bid Alternate items, if any, at the time of award of contract for the Base Bid. City reserves the right to authorize Contractor to perform the work specified in Bid Alternates at the prices indicated on the Bid Form by issuing a change order subsequent to the award of contract.

B. COMMENCEMENT OF WORK

1. The Contract Time will commence to toll upon the issuance of the Notice of Award, or on the day indicated in the Notice to Proceed. City may give a Notice to Proceed at any time within thirty (30) days after the Notice of Award. Contractor shall not perform any Work at the Site prior to the date on which the Contract Times commence to run.

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2. Tentatively, the City has scheduled the contract to be awarded on Monday, June 14th, 2021, with a Notice of Award to be issued by close of business on the following day. A Preconstruction Conference will be scheduled with the Contractor, with the issuance of a Notice to Proceed to follow, indicating the date on which contract time shall begin counting.

C. WORKING HOURS

1. Section 8-8 of the General Provisions of the Standard Specifications are applicable, except working hours shall be 8:00 a.m. to 4:30 p.m. Monday through Friday.
2. Material deliveries will be allowed between the hours of 7:00 a.m. and 9:00 a.m., M-F with prior authorizations. Request for authorization must be made at least two (2) working days prior to the delivery date.
3. After the contract time begins counting, a contract working day is defined as any day except Saturdays, Sundays, and City of Lafayette holidays.

PART 4. BONDS AND INSURANCE

A. BONDS

1. Within ten (10) calendar days following Notice of Award of Contract, Contractor shall file with City the following bonds:
 - a. Corporate surety bond, in the form of Document 00 61 14, "Construction Performance Bond," in the sum equal to 100% of the total contract price, to guarantee faithful performance of Contract Documents; and
 - b. Corporate surety bond, in the form of Document 00 61 27, "Construction Labor and Material Payment Bond," in the sum equal to 100% of the total contract price, to guarantee payment of wages for services engaged and of bills contracted for materials, supplies, and equipment used in performance of the Work.
2. Sureties must be satisfactory to City. Corporate sureties on these bonds and on bonds accompanying Bids must be duly licensed and admitted to do business in the State of California and must have an A.M. Best Company financial rating of A:VIII or better.

- B. INSURANCE.** Provisions of Document 00 73 15, "Insurance," shall apply.

PART 5. DRAWINGS AND SPECIFICATIONS

A. INTENT

1. Drawings and Specifications are intended to describe a functionally complete and operable Project (and all parts thereof) to be constructed in accordance with the requirements of Contract Documents. Contractor shall perform any work, and furnish any materials or equipment, that may reasonably be inferred from the requirements of Contract Documents or from prevailing custom or trade usage as being required to produce this intended result. Contractor shall interpret words or phrases used to describe Work, materials or equipment that have well-known technical or construction industry or trade meaning in accordance with that meaning. Drawings' intent specifically includes the intent to depict construction that complies with all applicable laws, codes and standards
2. As part of the "Work," Contractor shall provide all labor, materials, equipment, machinery, tools,

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facilities, services, employee training and testing, hoisting facilities, shop drawings, storage, testing, security, transportation, disposal, the securing of all necessary or required field dimensions, the cutting or patching of existing materials, notices, permits, documents, reports, agreements and any other items required or necessary to timely and fully complete Work described and the results intended by Contract Documents and, in particular, Drawings and Specifications. Divisions and Sections of Specifications and the identification on any Drawings shall not control Contractor in dividing Work among Subcontractors or suppliers or delineating the work to be performed by any specific trade.

3. Contractor shall perform reasonably implied parts of Work as “incidental work” although absent from Drawings and Specifications. Incidental work includes any work not shown on Drawings or described in Specifications that is necessary or normally or customarily required as a part of the Work shown on Drawings or described in Specifications. Incidental work includes any work necessary or required to make each installation satisfactory, legally operable, functional, and consistent with the intent of Drawings and Specifications or the requirements of Contract Documents including required tasks to be performed under Division 01 of Specifications. Contractor shall perform incidental work without extra cost to City. Incidental work shall be treated as if fully described in Specifications and shown on Drawings, and the expense of incidental work shall be included in the bid price and Contract Sum.

B. DRAWING DETAILS

1. A typical or representative detail on drawings shall constitute the standard for workmanship and material throughout corresponding parts of Work. Where necessary, and where reasonably inferable from drawings, Contractor shall adapt such representative detail for application to such corresponding parts of Work. The details of such adaptation shall be subject to prior approval by Engineer. Repetitive features shown in outline on drawings shall be in exact accordance with corresponding features completely shown.
2. Where details are not shown, Contractor shall rely on the knowledge, qualification, and experience of the trade, which is a prerequisite of entering into this Contract, to complete the work in a legal, functional, and satisfactory manner that is consistent with the intent of the Drawings and Specifications and the highest quality standard of the industry. City reserves its sole discretion to clarify and confirm Contractor’s interpretation of the intent and standard. Details not shown do not constitute the intended installation’s being outside the scope of Work.

C. INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

1. Before undertaking each part of Work, Contractor shall carefully study and compare Contract Documents and check and verify pertinent figures shown in Contract Documents and all applicable field measurements. Contractor shall be responsible for any errors that might have been avoided by such comparison. Figures shown on Drawings shall be followed; Contractor shall not scale drawings for measurements. Contractor shall promptly report to City, in writing, any conflict, error, ambiguity or discrepancy that Contractor may discover. Contractor shall obtain a written interpretation or clarification from City before proceeding with any Work affected thereby.
2. Contractor shall be responsible for the coordination of Work. Such coordination shall include, without limitation, the coordination of Drawings and prosecution of Work to avoid inefficiencies, stacking of trades, or any other delay to the completion of Work.
3. Section 4-2 and 5-5 of the General Provisions of the Standard Specifications shall apply.

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D. STANDARDS TO APPLY WHERE SPECIFICATIONS ARE NOT FURNISHED

1. The following general specifications shall apply wherever in the Specifications, or in any directions given by City in accordance with or supplementing Specifications, it is provided that Contractor shall furnish materials or manufactured articles or shall do work for which no detailed specifications are shown. Materials or manufactured articles shall be of the best grade, in quality and workmanship, obtainable in the market from firms of established good reputation. If not ordinarily carried in stock, the materials or manufactured articles shall conform to industry standards for first-class materials or articles of the kind required, with due consideration of the use to which they are to be put. Work shall conform to the usual standards or codes, such as those cited in Section 01 42 10, "References and Definitions," for first-class work of the kind required. Contractor shall specify in writing to City the materials to be used or work to be performed under this paragraph ten (10) business days prior to furnishing such materials or performing such work.

E. DEVIATION FROM SPECIFICATIONS AND DRAWINGS

1. Contractor must perform work in accord with Drawings and Specifications. Contractor may deviate from Drawings or the dimensions given in the Drawings, and may deviate from the Specifications, only upon City's written approval of the proposed deviation. City's review or approval of Contractor's shop drawings or other submittals does not constitute and shall not be deemed to be approval of any deviation from the Drawings and Specifications unless expressly noted otherwise by City. Contractor is solely responsible for compliance with the Contract Documents. City's failure to detect non-compliance in Contractor's shop drawings and submittals shall not be construed as approval of said non-compliance, nor shall it relieve Contractor of its responsibility for compliance.
2. City may order that locations, lines and grades for Work vary from those shown on Drawings. Changes may be made in locations, lines or grades for Work under any item of Contract Documents. No payment in addition to unit price fixed in Contract Documents for Work under respective items will be allowed on account of variations from Drawings in unit price items. In lump sum contracts, or where there are no unit price items covering work affected by variations of locations, lines or grades, all changes in Contract Documents will be made as set forth in Part 14 of this Document 00 72 00 and Section 01 25 10, "Modification Procedures."

F. PRECEDENCE OF DOCUMENTS

1. In the case of discrepancy or ambiguity in Contract Documents, the following order of precedence shall prevail: (a) Change Orders or Work Change Directives; (b) Modifications and addenda in inverse chronological order, and in the same order as specific portions they are modifying; (c) Project Drawings and Specifications; (d) City of Lafayette Standard Specifications; (e) Any referenced specifications; (f) Shop Drawings and Submittals (See Paragraph E.1 above).
2. Written numbers supersede over figures, unless obviously incorrect. Figured dimensions supersede over scaled dimensions. Large-scale drawings supersede over small-scale drawings. **Any conflict between Drawings and Specifications will be resolved to favor the product or result of higher quality or cost and more stringent requirement, or the intended product or result as interpreted by the City based on the documents, surrounding conditions, and industry best practices.**
3. When there is any conflict between a bill or list of materials shown in Contract Documents

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and the actual quantities required to complete Work required by Contract Documents, the actual quantities shall take precedence.

G. OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND CONTRACT DOCUMENTS

1. Drawings, Specifications and other Contract Documents were prepared for use for Work of Contract Documents only. No part of Contract Documents shall be used for any other construction or for any other purpose except with the written consent of City. Any unauthorized use of Contract Documents is prohibited and at the sole liability of the user.

PART 6. NOT USED

PART 7. CITY AUTHORITY

A. CITY'S REPRESENTATIVES

1. City's designated authorized representative is the Engineer, who shall have authority to act on behalf of City as set forth in Contract Documents. Except as otherwise provided in these Contract Documents, City shall issue all communications to Contractor through the Engineer and Contractor shall issue all communications to City through the Engineer in a written document delivered to City. There shall be no communications between Contractor and Architect, or any other personnel perceived to represent the City without the knowledge of the Engineer. Contractor shall not take direction from any person except the Engineer, and shall be solely responsible for all consequences of his actions as a result of following directions from persons other than the Engineer.

B. MEANS AND METHODS OF CONSTRUCTION

1. Section 5-16 of the General Provisions of the Standard Specifications shall apply.
2. Subject to those rights specifically reserved in Contract Documents, City shall not supervise, or direct, or have control over, or be responsible for, Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or Contractor's failure to comply with laws and regulations applicable to the furnishing or performance of Work. City shall not be responsible for Contractor's failure to perform or furnish the Work in accordance with Contract Documents.

PART 8. CONTROL OF THE WORK

A. SUPERVISION OF WORK BY CONTRACTOR

1. Section 6-17 of the General Provisions of the Standard Specifications shall apply.
2. Contractor shall supervise, inspect and direct Work competently and efficiently, devoting the attention and applying such personal skills and expertise as may be required and necessary to perform Work in accordance with Contract Documents. Contractor shall be solely responsible for and have control and charge of construction materials, means, methods, techniques, sequences and procedures, safety precautions and programs in connection with the work, including completed work until final acceptance. Contractor shall be responsible to see that the completed Work complies accurately with Contract Documents.
3. Contractor shall keep on the Site at all times during Work progress a competent resident Superintendent, who shall not be replaced without City's express written consent. Section 5-8 of the General Provisions of the Standard Specifications shall apply.

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B. OBSERVATION OF WORK BY CITY

1. Work shall be performed under City's general observation and administration. Contractor shall comply with City's directions and instructions in accordance with the terms of Contract Documents, but nothing contained in these General Conditions shall be taken to relieve Contractor of any obligations or liabilities under Contract Documents. City's failure to review or, upon review, failure to object to any aspect of Work reviewed, shall not be deemed a waiver or approval of any non-conforming aspect of Work.
2. Architect and other design professionals will advise and consult with City, but will have no authority to act on behalf of City.

C. ACCESS TO WORK

1. During performance of Work, City and its agents, consultants, and employees may at any time enter upon Work, shops where any part of the Work may be in preparation, or factories where any materials for use in Work are being or are to be manufactured, and Contractor shall provide proper and safe facilities for this purpose and shall make arrangements with manufacturers to facilitate inspection of their processes and products to such extent as City's interests may require. Other contractors performing work for City may also enter upon Work for all purposes required by their respective contracts. Subject to the rights reserved in Contract Documents, Contractor shall have sole care, custody and control of the Site and its work areas.

D. EXISTING UTILITIES

1. Section 7 of the General Provisions of the Standard Specifications shall apply.
2. At no additional cost to City, Contractor must incorporate into the work the maintenance and continuous operation of utility services to the existing building during the building's hours of operation. This may include main or trunkline utilities and other utilities or underground structures known or reasonably discernible and that will remain in service, including minor adjustments to design location or minor relocations of the existing installations. Contractor must take immediate action to restore any in service installations damaged by Contractor's operations. Should City determine that Contractor has not responded in a timely manner or not diligently pursued completion of the work, City may restore service and deduct the costs of such action by City from the amounts due under the Contract.
3. Nothing in these General Conditions shall be deemed to require City to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the Site can be inferred from the presence of other visible facilities Contractor shall immediately secure all available information and notify City and utility, in writing, of its discovery while performing the Work under the Contract Documents of any utility facilities not identified in the Drawings and Specifications.
4. The amount of utility service consumed by Contractor shall be charged to or paid for by Contractor at the prevailing rates charged to City. Contractor's failure to pay shall result in City deducting the subject amount from any contract payment due to Contractor.

PART 9. WARRANTIES, GUARANTY AND INSPECTION OF WORK

A. WARRANTY AND GUARANTY

1. All provisions in Document 00 65 37, "Guaranty," shall apply.
2. Contractor further represents and warrants that it is and will be at all times fully qualified and

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capable of performing every phase of Work and to complete Work in accordance with the terms of Contract Documents. Contractor warrants that all construction work and construction services shall be performed in accordance with generally accepted professional standards of good and sound construction practices and all requirements of Contract Documents. Contractor warrants that Work, including but not limited to each item of materials and equipment incorporated therein, shall be new, of suitable grade of its respective kind for its intended use; and free from defects in design, engineering, materials, construction and workmanship. Contractor warrants that Work shall conform in all respects with all applicable requirements of federal, state and local laws, applicable construction codes and standards, licenses, and permits, Drawings and Specifications and all descriptions set forth therein, and all other requirements of Contract Documents.

3. Contractor represents and warrants that he, his employees and subcontractors, and their employees shall at all times have and maintain in good standing any and all certifications and licenses required by applicable federal, state, and other governmental and City requirements applicable to the work.
4. Contractor represents and warrants that it has studied carefully all requirements of the specifications regarding procedures for demolition, hazardous waste abatement, or safety practices, specified in this contract, and prior to submitting its bid, has either (a) verified to its satisfaction that the specified procedures are adequate and sufficient to achieve the results intended by Contract Documents, or (b) by way of approved "or equal" request or request for clarification and written Addenda, secured changes to the specified procedures sufficient to achieve the results intended by Contract Documents. Contractor accepts the risk that any specified procedure will result in a completed project in full compliance with the contract requirements.
5. Extended Guarantees: Any guaranty exceeding one year provided by the supplier or manufacturer of any equipment or materials used in the Project shall be extended for such term. Contractor expressly agrees to act as co-guarantor of such equipment and materials and shall supply City with all warranty and guarantee documents relative to equipment and materials incorporated in the Project and guaranteed by their suppliers or manufacturers.
6. Environmental and Toxics Warranty: The covenants, warranties and representations contained in this Paragraph 9.A are effective continuously during Contractor's work on the Project and following cessation of labor for any reason, including but not limited to, Project completion. Contractor covenants, warrants and represents to City that:
 - a. To Contractor's knowledge after due inquiry, no lead or asbestos-containing materials were installed or discovered in the Project at any time during Contractor's construction thereof. If any lead or asbestos-containing materials were discovered, Contractor made immediate written disclosure to City.
 - b. To Contractor's knowledge after due inquiry, no electrical transformers, light fixtures with ballasts or other equipment containing PCB's are or were located on the Project at any time during Contractor's construction thereof.
 - c. To Contractor's knowledge after due inquiry, no hazardous materials or toxic substances or storage containers therefor are or were located on the Project at any time during Contractor's construction thereof, excepting those used in a manner that both (i) does not violate, or require reporting or disclosure under any environmental or other applicable law, and (ii) is consistent with best practices for completing Contractor's Work under the Contract Documents. If any such uses or installations were discovered, Contractor shall make immediate written disclosure to City.

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Contractor shall bear sole and complete responsibility and liability for any and all hazardous materials or toxic substances incorporated into the Project, whether permitted under this Section or not, and shall defend, indemnify, and hold City harmless from and against any claims, demands, damages, losses, or liabilities arising out of or relating to hazardous materials or toxic substances incorporated into the Project as set forth in Part 13 of this Document.

- d. Contractor's operations concerning the Project are and were not in violation of any applicable environmental federal, state, or local statute, law or regulation dealing with hazardous materials substances or toxic substances and no notice from any governmental body has been served upon Contractor claiming any violation of any such law, ordinance, code or regulation, or requiring or calling attention to the need for, any work, repairs, construction, alteration, or installation on or in connection with the Project in order to comply with any such laws, ordinances, codes or regulations, with which Contractor has not complied. If there are any such notices with which Contractor has complied, Contractor shall provide City with copies thereof.

7. Warranty Retention: Will not apply for this Contract.

B. INSPECTION OF WORK

1. All materials, equipment and workmanship used in Work shall be subject to inspection and testing at all times during construction and/or manufacture in accordance with the terms of Contract Documents. Work and materials, and manufacture and preparation of materials, from beginning of construction until final completion and acceptance of Work, shall be subject to inspection and rejection by City, its agents, or independent contractors retained by City to perform inspection services, or governmental agencies with jurisdictional interests. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's site safety procedures and program so that they may comply therewith as applicable. Upon request or where specified, City shall be afforded access for inspection at the source of supply, manufacture or assembly of any item of material or equipment, with reasonable accommodations supplied for making such inspections.
2. Contractor shall give City timely notice of readiness of Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
3. If applicable laws or regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, and furnish City with the required certificates of inspection, or approval. City shall pay the cost of initial testing and Contractor shall pay all costs in connection with any follow up or additional testing. Contractor shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for the acceptance of materials or equipment to be incorporated in the Work, or of materials, mixed designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.
4. If Contractor covers any Work, or the work of others, prior to any required inspection, test or approval without written approval of City, Contractor must uncover the Work at City's request. Contractor shall bear the expense of uncovering Work and replacing Work.
5. In any case where Contractor covers Work contrary to City's request, Contractor must uncover Work for City's observation or inspection at City's request. Contractor shall bear the

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cost of uncovering Work.

6. Whenever required by City, Contractor shall furnish tools, labor and materials necessary to make examination of Work that may be completed or in progress, even to extent of uncovering or taking down portions of finished Work. Should Work be found unsatisfactory, cost of making examination and of reconstruction shall be borne by Contractor. If Work is found to be satisfactory, City, in manner herein prescribed for paying for alterations, modifications and extra work, except as otherwise herein specified, will pay for examination.
7. Inspection of the Work by or on behalf of City, or its failure to do so, shall not be deemed a waiver or approval of any non-conforming aspect of the Work.

C. CORRECTION OF DEFECTIVE WORK

1. If Contractor fails to supply sufficient skilled workers, suitable materials or equipment, or to furnish or perform the Work in such a way that the completed Work will conform to Contract Documents in a timely manner, City may order Contractor to replace any defective Work, or stop any portion of Work to permit City (at Contractor's expense) to replace such defective work. These City rights are entirely discretionary on the part of the City and shall not give rise to any duty on the part of City to exercise the rights for the benefit of Contractor or any other party.
2. City may direct Contractor to correct any defective Work or remove it from the Site and replace it with Work that is not defective and satisfactorily correct or remove and replace any damage to other Work or the work of others resulting from the correction or removal. Contractor shall be responsible for any and all claims, costs, losses and damages caused by or resulting from such correction or removal.
3. City's rights under this paragraph 9.C shall be in addition to any other rights it may have under Contract Documents. Where Contractor fails to correct defective work City shall have all rights and remedies granted by law.
4. Correction Period: If within one year after the date of Final Acceptance, or such longer period of time as may be prescribed by laws or regulations, or by the terms of Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to City and in accordance with City's written instructions, correct such defective Work. Contractor shall remove any defective Work rejected by City and replace it with Work that is not defective, and satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If Contractor fails to promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, City may have the defective Work corrected or the rejected Work removed and replaced. Contractor shall pay for all claims, costs, losses and damages caused by or resulting from such removal and replacement. Where Contractor fails to correct defective work, or defects are discovered outside the correction period, City shall have all rights and remedies granted by law.
5. Where defective or rejected Work (and damage to other work resulting therefrom) has been corrected, removed or replaced under this provision after the commencement of the correction period, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

D. ACCEPTANCE AND CORRECTION OF DEFECTIVE WORK BY CITY

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1. City may accept defective Work. Contractor shall pay all claims, costs, losses and damages attributable to City's evaluation of and determination to accept such defective Work. If City accepts any defective work prior to final payment, a Change Order will be issued incorporating the necessary revisions in Contract Documents with respect to the Work and the Contract Sum. If the parties are unable to agree to the amount of an appropriate decrease in the Contract Sum, City may deduct from monies due Contractor, all claims, costs, losses, damages, expenses and liabilities attributable to the defective work. If Contractor disagrees with City's calculations, it may make a claim as provided in Part 12 of this Document 00 72 00. If City accepts any defective work after final payment, Contractor shall pay to City an appropriate amount as determined by City.
2. City may correct and remedy deficiency if, after seven (7) calendar days written notice to Contractor, Contractor fails to correct defective Work or to remove and replace rejected Work in accordance with Paragraph 9.C of these General Conditions; or provide a plan for correction of defective Work acceptable to City; or perform Work in accordance with Contract Documents. In connection with such corrective and remedial action, City may exclude Contractor from all or part of the Site, take possession of all or part of Work and suspend Contractor's work related thereto, take possession of all or part of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in Work any materials and equipment stored at the Site or for which City has paid Contractor but which are stored elsewhere. Contractor shall allow City, its representatives, agents, employees, and other contractors and Architect's consultants access to the Site to enable City to exercise the rights and remedies under this Paragraph 9.D. Contractor shall be responsible for all claims, costs, losses, damages, expenses and liabilities incurred or sustained by City in exercising such rights and remedies.

E. RIGHTS UPON INSPECTION OR CORRECTION

1. Contractor shall not be allowed an extension of Contract Times because of any delay in the performance of Work attributable to the exercise by City of its rights and remedies under this Paragraph 9 of these General Conditions. Where City exercises its rights under this Paragraph 9, it retains all other rights it has by law or under Contract Documents, including but not limited to, the right to terminate Contractor's right to proceed with the Work under the Contract Documents and/or make a claim or backcharge where a Change Order cannot be agreed upon.
2. Inspection shall not relieve Contractor of its obligation to have furnished material and workmanship in accordance with Contract Documents. Payment for work completed through periodic progress payments or otherwise shall not operate to waive City's right to require full compliance with Contract Documents and shall in no way be deemed as acceptance of the Work paid therefor. Contractor's obligation to complete the Work in accordance with Contract Documents shall be absolute, unless City agrees otherwise in writing.

F. SAMPLES AND TESTS OF MATERIALS AND WORK

1. Section 5-14 of the General Provisions of the Standard Specifications shall apply. Contractor shall furnish and prepare samples or test specimens at its expense.

G. PROOF OF COMPLIANCE OF CONTRACT PROVISIONS

1. In order that City may determine whether Contractor has complied or is complying with requirements of Contract Documents not readily enforceable through inspection and tests of Work and materials, Contractor shall at any time when requested submit to City properly authenticated documents or other satisfactory proofs of compliance with all applicable

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requirements.

H. ACCEPTANCE

1. Inspection by City or its authorized agents or representatives, any order or certificate for the payment of money, any payment, acceptance of the whole or any part of Work by City, any extension of time, any verbal statements on behalf of City or its authorized agents or representatives shall not operate as a waiver or modification of any provisions of Contract Documents, or of any power reserved to City herein or therein or any right to damages provided in Contract Documents. Any waiver of any breach of Contract Documents shall not be held to be a waiver of any other subsequent breach.

PART 10. CONTRACTOR'S ORGANIZATION AND EQUIPMENT

A. CONTRACTOR'S LEGAL ADDRESS

1. Address, email, and facsimile number given in Contractor's Bid are hereby designated as Contractor's legal address and facsimile number.

B. NOT USED.

C. PROFICIENCY IN ENGLISH

1. Any person employed or associated with the Contractor in any way under this contract, and who have unescorted access to the Site, must possess proficiency in the English language in order to read drawings and specifications and to understand, receive and carry out oral and written communications or instructions relating to their job functions, including safety and security requirements.

D. CONTRACTOR'S AND SUBCONTRACTORS' EMPLOYEES

1. Contractor shall employ, and shall permit its Subcontractors to employ, only competent and skillful personnel to do Work. Contractor's attention is directed to Section 5-10, "Character of Workmen," of the General Provisions of the Standard Specifications.

E. CONTRACTOR TO SUPPLY SUFFICIENT WORKERS AND MATERIALS

1. Unless otherwise required by City under the terms of Contract Documents, Contractor shall at all times keep on the Site materials and employ qualified workers sufficient to prosecute Work at a rate and in a sequence and manner necessary to complete Work, including punch list work, within the Contract Times. This obligation shall remain in full force and effect notwithstanding disputes or claims of any type.
2. At any time during progress of Work should Contractor directly or indirectly (through subcontractors) refuse, neglect, or be unable to supply sufficient materials or employ qualified workers to prosecute the Work as required, including completion of the punch list, City may notify Contractor to accelerate the Work and/or furnish additional qualified workers or materials as City may consider necessary, at no cost to City. If Contractor does not comply with the notice within three (3) business days of date of service thereof, City shall have the right (but not a duty) to provide materials and qualified workers to finish the Work or any affected portion of Work, as City may elect. City shall deduct from monies due or which may thereafter become due under Contract Documents, the sums necessary to meet expenses thereby incurred and paid to persons supplying materials and doing Work. City shall deduct from funds or appropriations set aside for purposes of Contract Documents the amount of

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such payments and charge them to Contractor as if paid to Contractor. Contractor shall remain liable for resulting delay, including liquidated damages and indemnification of City from claims of others.

3. Exercise by City of the rights conferred upon them in Paragraph 10.E.2 above, is entirely discretionary on the part of City. City shall have no duty or obligation to exercise the rights referred to in Paragraph 10.E.2 of these General Conditions and its failure to exercise such rights shall not be deemed an approval of existing work progress or a waiver or limitation of City's right to exercise such rights in other concurrent or future similar circumstances. The rights conferred upon City under Paragraph 10.E.2 above are cumulative to City's other rights under provisions of the Contract Documents.

F. CONTRACTOR'S USE OF THE SITE

1. Contractor shall not make any arrangements with any person to permit occupancy or use of any land, structure or building within the limits of the work, for any purpose whatsoever, either with or without compensation, in conflict with any agreement between City and any owner, former owner or tenant of such land, structure or buildings. Contractor may not occupy City or City-owned property outside the limit of the work as shown on Drawings unless it obtains prior approval from City.
2. Contractor's staging and storage of people, equipment, and materials of any kind on the Project Site is subject to prior approval by the Engineer. Contractor acknowledges that he is aware of the Work Site being a part of the Lafayette Community Center with on-going programs and operations for the entire duration of Work. Contractor shall accommodate said programs and operations in his prosecution of the Contract, including preserving safe public access and ensuring that construction crew, materials, equipment, and activities do not interfere with these programs and operations. Contractor shall not be entitled to claims of inconvenience, delay, increased overhead, or loss of production of any kind as a result of said accommodation.

G. CONTRACTOR SHALL LIST TRADES WORKING

1. Contractor shall report the trades working on the site and their scheduled activities on a daily basis to the inspector and Engineer no later than 9 a.m. of the following morning.

PART 11. PROSECUTION AND PROGRESS OF THE WORK

A. LINES AND GRADES

1. Contractor shall verify the grades shown on Drawings with existing grades in a manner consistent with prudent construction industry standards and notify the Engineer of any discrepancies before proceeding with the Work. Unless directed otherwise by the Engineer, Contractor shall do Work to lines and grades established by Contractor at Contractor's expense. Contractor shall not willfully construct any work that appears to conflict with the intent of the Contract Documents or commonly accepted industry standards.
2. No direct payment will be made for Contractor's cost of any Work or delay occasioned by establishing or checking lines and grades or making other measurements, or by inspection, and no extension of time will be allowed for such delays.

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3. At City's request, Contractor shall, without charge, provide workers from Contractor's force, and tools and materials, to assist City temporarily in making measurements and surveys and in establishing temporary or permanent reference marks. At times it may be necessary to discontinue portions of Contractor's work in order for City to make measurements or surveys without interruptions or other interference that might impair accuracy of results. At any time, on City's request, Contractor shall discontinue work to such extent as may be necessary for City's purposes.
4. The City reserves the right to make adjustments in design lines and grades to accommodate field conditions as determined by the Engineer. To the extent that these adjustments do not change the overall scope of the Work or the schedule thereof, Contractor shall have no grounds for any claims of inconvenience, delay, loss of production, or extra work of any kind.

B. COST DATA

1. Contractor shall maintain full and correct information as to the number of workers employed in connection with each subdivision of Work, the classification and rate of pay of each worker in form of certified payrolls, the cost to Contractor of each class of materials, tools and appliances used by Contractor in Work, and the amount of each class of materials used in each subdivision of Work. Contractor shall provide City with this information as requested. If contractor maintains summaries or reports comparing actual project costs with bid estimates or budgets, it shall provide City with a copy of such report whenever it is generated.
2. Contractor shall maintain daily job reports recording all significant activity on the job, including the number of workers on site, work activities, problems encountered and delays. Each worker shall be identified by name and employer. Contractor shall provide City with copies each day. Contractor shall take weekly progress photographs of all areas of the Work. Contractor shall maintain copies of all correspondence with subcontractors and records of meetings with subcontractors.
3. City shall have the right to audit and copy Contractor's books and records of any type, nature or description relating to the Project (including but not limited to financial records), and to inspect the Site, including Contractor's trailer, or other job site office, and this requirement shall be contained in the subcontracts of subcontractors working on site. By way of example, City shall have the right to inspect and obtain copies of all Contract Documents, planning and design documents, Bid proposal and negotiation documents subject to Document 00 67 00, "Escrow Bid Documents," cost records and job cost variance reports, design modification proposals, value engineering or other cost reduction proposals, revisions made to the original design, job progress reports, photographs, and as-built drawings maintained by Contractor. City, State Auditor General and any other applicable governmental entity shall have the right to inspect all information and documents maintained under this Paragraph 11.B at any time during the Project and for a period of five years following Substantial Completion. This right of inspection shall not relieve Contractor of its duties and obligations under Contract Documents. This right of inspection shall be specifically enforceable in a court of law, either independently or in conjunction with enforcement of any other rights in Contract Documents. All data audited or provided during an audit shall be provided in its native format.
4. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Contract Modifications, Change Orders, Field Directions, Force Account orders, and written interpretations and clarifications in good order and annotated to show all changes made during construction. These record documents, together with all approved samples and a counterpart of all approved shop drawings, shall be maintained and available to City for reference. Upon completion of the Work, Contractor shall deliver to City the Record Documents, samples and shop drawings and as-built drawings.
5. The City shall not process any progress payment requests without the timely submittals as

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specified in these General Conditions.

PART 12. CLAIMS BY CONTRACTOR

A. GENERAL

1. **Contract Interpretation Disputes:** Should it appear to Contractor that Work to be performed or any of the matters relative to Contract Documents are not satisfactorily detailed or explained therein, or should any questions arise as to the meaning or intent of Contract Documents, Contractor shall give written notice to City. Contractor shall bear all costs incurred in giving notice. City shall render a determination regarding the issue, and its decision shall be considered final. City shall have the right but not the obligation to affirm or disaffirm the Architect's interpretation of Drawings or Specifications (if any) and City's decision to affirm or disaffirm shall be final. If Contractor disagrees with City's decision, Contractor's sole and exclusive remedy is to file a claim in accordance with this Part 12 of these General Conditions. Contractor shall diligently prosecute the Disputed Work (as defined below) to Final Completion pending resolution of any claim.
2. **Work Disputes:** Contractor shall give written notice to City of any dispute arising under Contract Documents respecting the true value of any Work performed, the implementation of Work required by Contract Documents, any Work omitted, any extra Work that Contractor may be required to perform or time extensions, respecting the size of any payment to Contractor during the performance of Contract Documents, or of compliance with Contract Documents procedures. City shall render a determination regarding the issue, and its decision shall be considered final. If Contractor disagrees with City's decision, Contractor's sole and exclusive remedy is to file a claim in accordance with this Part 12 of these General Conditions. Pending the resolution of any claim, Contractor shall diligently prosecute the Disputed Work to Final Completion.
3. The claim notice and documentation procedure described in this Part 12 applies to all claims and disputes arising under Contract Documents, including without limitation any claim or dispute by any subcontractor or material supplier. All subcontractor and supplier claims of any type shall be brought only through Contractor as provided in Part 12 of these General Conditions. Under no circumstances shall any subcontractor or supplier make any direct claim against City.
4. "Claim" means a written demand or written assertion by Contractor seeking, as a matter of right, the payment of money, the adjustment or interpretation of Contract Documents terms, or other relief arising under or relating to Contract Documents. In order to qualify as a "claim," the written demand must state that it is a claim submitted under Part 12 of these General Conditions.
5. A voucher, invoice, payment application, or other routine or authorized form of request for payment is not a claim under Contract Documents. If such request is disputed as to liability or amount, then the disputed portion of the submission may be converted to a claim under Contract Documents by submitting a separate claim in compliance with claim submission requirements.
6. The provisions of this Part 12 of these General Conditions survive termination or completion of Contract Documents. Contractor shall bear all costs incurred in the preparation and submission of a claim. Claim notice provisions of this Part 12 shall not relieve Contractor from providing other claim notices required by law.

B. PROCEDURE

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1. Should any clarification, determination, action or inaction by City, Work, or any other event, in the opinion of Contractor, exceed the requirements of or not comply with Contract Documents, or otherwise result in Contractor seeking additional compensation in time or money for any reason (collectively "Disputed Work"), then Contractor and City shall make good faith attempts to resolve informally any and all such issues, claims and/or disputes. Before commencing the Disputed Work, or within seven (7) calendar days after Contractor's first knowledge of the Disputed Work, whichever is earlier, Contractor must file a written notice, cost, and schedule proposal for the Disputed Work with City stating clearly and in detail its objection and reasons for contending the Work or interpretation is outside the requirements of Contract Documents. If a written notice, cost, and schedule proposal for Disputed Work is not issued within this time period, or if Contractor proceeds with the Disputed Work without first having given the notice required by this Paragraph, Contractor shall waive its rights to further claim on the specific issue.
2. City will review Contractor's timely notice and cost and schedule proposal for Disputed Work and provide a decision. If, after receiving the decision, Contractor disagrees or still considers the Work required to be outside of the requirements of Contract Documents, it shall so notify City within seven (7) calendar days after receiving the decision by submitting a notice of potential claim, stating that a formal claim will be issued. Within thirty (30) calendar days of receiving the decision, Contractor shall submit its claim in the form specified herein and all arguments, justification, cost or estimates, schedule analysis, and detailed documentation supporting its position. Contractor's failure to furnish notification within seven (7) calendar days and all justifying documentation within thirty (30) calendar days will result in Contractor waiving its right to the subject claim. If Disputed Work persists longer than thirty (30) days, then Contractor shall, every thirty (30) days until the Disputed Work ceases, submit to City a document titled "Claim Update" which shall update and quantify all elements of the claim as completely as possible. Contractor's failure to submit a Claim Update or to quantify costs every thirty (30) days shall result in waiver of the claim for that thirty (30) day period. Claims or Claim Updates stating that damages, total damages (direct and indirect) and/or any time extension will be determined at a later date shall not comply with this Paragraph and shall result in Contractor waiving its claim(s).
3. Within thirty (30) days of receipt of Contractor's formal claim including all arguments, justifications, cost or estimates, schedule analysis, and documentation supporting its position as previously stipulated, City or its designee will review the issue and render a final determination. If Contractor's claims submitted in accordance with this Part 12 at project completion total less than \$375,000, then claims resolution shall proceed in the manner prescribed by Article 1.5, Chapter 1, Part 3 of Division 2 of the California Public Contract Code.
4. Claims shall be calculated in the same manner as Change Orders per Section 01 25 10, "Modification Procedures". Except where provided by law, or elsewhere in these contract documents (if applicable), city shall not be liable for special or consequential damages, and contractor shall not include them in its claims. Contractor shall be limited in its recovery on claims to the change order calculations set forth in section 01 25 10, "Modification Procedures".

C. CLAIM FORMAT

1. Contractor shall submit as part of its claim justification no less than the information and data described in Section 10-3.1 of the General Provisions of the Standard Specifications. Said claim shall be accompanied by a certificate as specified in Section 10-3.3 of the General Provisions of the Standard Specifications.

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D. EXCLUSIVE REMEDY

1. Contractor's performance of its duties and obligations specified in Part 12 of these General Conditions and submission of a claim as provided in Part 12 is Contractor's sole and exclusive remedy for the payment of money, extension of time, the adjustment or interpretation of Contract Documents terms or other contractual, equitable, or tort relief arising from Contract Documents. This exclusive remedy and the limitation of liability (expressed herein and elsewhere throughout Contract Documents) apply notwithstanding the completion, termination, suspension, cancellation, breach or rescission of the Work or Contract Documents, negligence or strict liability by City, its representatives, consultants or agents, or the transfer of Work or the Project to City for any reason whatsoever. Contractor waives all claims of waiver, release, bar, or any other type of excuse for non-compliance with the claim submission requirements. Compliance with the notice and claim submission procedures described in Part 12 is a condition precedent to the right to commence litigation, file a Government Code Claim, or commence any other legal action. No claim or issues not raised in a timely protest and timely claim submitted under this Part 12 may be asserted in any Government Code Claim, subsequent litigation, or legal action. City shall not have deemed to waive any provision under Part 12, if at City's sole discretion, a claim is accepted in a manner not in accordance with Part 12.

E. CLAIM RESOLUTION

1. Section 10-3.4.1 and 10-4 of the General Provisions of the Standard Specifications shall apply for submitted claims less than \$50,000. For submitted claims more than \$50,000 but less than \$375,000, then claims resolution shall proceed in the manner prescribed by Article 1.5, Chapter 1, Part 3 of Division 2 of the California Public Contract Code.
2. All claims not subject to the claim resolution procedures set forth in said sections shall be subject to litigation unless otherwise agreed to. As a condition precedent to the filing and prosecution of litigation, the claim must first be mediated. Mediation shall be non-binding and utilize the services of a mediator mutually acceptable to the parties, and, if the parties cannot agree, a mediator selected by the American Arbitration Association from its panel of approved mediators trained in construction industry mediation. All statutes of limitation shall be tolled from the date of the demand for mediation until a date two weeks following the mediation's conclusion. All unresolved claims shall be submitted to the same mediator. The cost of mediation shall be equally shared.

PART 13. LEGAL AND MISCELLANEOUS

A. LAWS AND REGULATIONS

1. Contractor shall keep fully informed of and shall comply with all laws, ordinances, regulations and orders of any properly constituted authority affecting Contract Documents, Work and persons connected with Work, and shall protect and indemnify City and its officers, employees, consultants and agents against any claim or liability, including attorney's fees, arising from or based on violation of law, ordinance, regulation or order, whether by Contractor or by Subcontractors, employees or agents. Authorized persons may at any time enter upon any part of Work to ascertain compliance of all applicable laws, ordinances, regulations and orders.
2. Whenever Drawings and Specifications require large sizes or higher standards than are required by any applicable law, ordinance, regulation or order, Drawings and Specifications shall govern. Whenever Drawings and Specifications require something which will violate

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such laws, ordinances, regulations or orders, then such laws, ordinances, regulations or orders shall govern.

B. PERMITS AND TAXES

1. Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to due and lawful prosecution of Work, unless otherwise provided herein. City will pay applicable building permit fees only, except as otherwise provided in Contract Documents. Contractor shall pay all sales and/or use taxes levied on materials, supplies, or equipment purchased and used on or incorporated into Work, and all other taxes properly assessed against equipment or other property used in connection with Work, without any increase in the Contract Price.

C. INDEMNIFICATION

1. To the fullest extent allowed by law, Contractor shall defend (with Counsel of City's choosing), indemnify and hold the City, its elected officials, directors, officers, employees, agents and authorized volunteers free and harmless from and against any and all claims, demands, causes of action, costs, expenses, liabilities, losses, damages or injuries, at law or in equity, regardless of whether the allegations are false, fraudulent, or groundless, to property or persons, including wrongful death, to the extent arising out of or incident to any acts, omissions or willful misconduct of Contractor, its officials, officers, employees, agents, consultants and contractors arising out of or in connection with the performance of the Work or this Contract, including claims made by subcontractors for nonpayment, including without limitation the payment of all consequential damages and attorneys' fees and other related costs and expenses. Contractor shall defend, at Contractor's own cost, expense and risk, with Counsel of City's choosing, any and all such aforesaid suits, actions or other legal proceedings of every kind that may be brought or instituted against City, its elected officials, officers, employees, agents and authorized volunteers. To the extent of its liability, Contractor shall pay and satisfy any judgment, award or decree that may be rendered against City, its elected officials, officers, employees, agents and authorized volunteers in any such suit, action or other legal proceeding. Contractor shall reimburse City, its elected officials, officers, employees, agents and authorized volunteers for any and all legal expenses and costs incurred by each of them in connection therewith or in enforcing the indemnity herein provided. The only limitations on this provision shall be those imposed by Civil Code Section 2782.

D. NOTICE OF CONCEALED OR UNKNOWN CONDITIONS

1. If either of the following conditions is encountered at Site, Contractor shall give written notice to City promptly before conditions are disturbed (except in an emergency as required by Paragraph 16.D of these General Conditions), and in no event later than seven (7) days after first observance of (a) Latent physical conditions which differ materially from those indicated in Contract Documents; (b) Unknown physical conditions of an unusual nature or which differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in Contract Documents.
2. In response to Contractor's written notice under Paragraph 13.D of these General Conditions, City will investigate the identified conditions, and if they differ materially and cause increase or decrease in Contractor's cost of, or time required for, performance of any part of the Work, City will issue a Change Order under the procedures described in Contract Documents. If City determines that physical conditions at the Site are not latent or are not materially different from those indicated in Contract Documents or that no change in terms of Contract

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Documents is justified, City shall so notify Contractor in writing, stating reasons. If City and Contractor do not agree on an adjustment in Contract Sum or Contract Times, Contractor shall proceed with the Work as directed by City and may file a claim as provided in Part 12 of these General Conditions.

3. Contractor shall not be entitled to any adjustment in the Contract Sum or Contract Times regarding claimed Latent or materially different Site conditions if (a) Contractor knew of the existence of such conditions at the time Contractor submitted its Bid; or (b) Contractor should have known of the existence of such conditions as a result of having complied with the requirements of Contract Documents, including without limitation Paragraph 13.D of these General Conditions; or (c) the information or conditions claimed by Contractor to be Latent or materially different consist of information, conclusions, opinions or deductions of the kind that Paragraph 13.D precludes reliance upon; or (d) Contractor was required to give written notice under Paragraph 13.D and failed to do so within the time required.
4. If City and Contractor are unable to agree on entitlement to or as to the amount or length of any adjustment in the Contract Sum or Contract Times required under this Paragraph, Contractor shall proceed with the Work as directed by City and may make a claim as provided in Part 12 of these General Conditions.
5. In the event the City exercises its rights to decide disputed issues pertaining to changed work, as set forth above, then the resulting Change Order shall be effective when signed by the City and notwithstanding the fact that the Contractor has not signed it.
6. The cost of all of the following will be included in the Contract Sum and Contractor shall have full responsibility for (a) reviewing and checking all available information and data, including but not limited to, Document 00 32 00, "Existing Conditions".

E. NOTICE OF HAZARDOUS WASTE OR MATERIALS CONDITIONS

1. Notice by Contractor shall be given in writing to City promptly, before any of the following conditions are disturbed (except in an emergency as required by Paragraph 16.D below), and in no event later than 24 hours after first observance, of any (a) material that Contractor believes may be material that is hazardous waste or hazardous material, as defined in Section 25117 of the Health and Safety Code (including, without limitation, asbestos, lead, PCBs, petroleum and related hydrocarbons, and radioactive material) that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law; (b) other material which may present a substantial danger to persons or property exposed thereto in connection with Work at the Site.
2. Except as otherwise provided in Contract Documents or as provided by applicable law, Contractor shall not be required to give any notice for the disturbance or observation of any such hazardous waste or hazardous material where such matter is disturbed or observed as part of the scope of Work under Contract Documents (such as hazardous waste or hazardous material investigation, remediation or disposal activities which are identified as the subject of Work under Contract Documents), where Contractor complies with all requirements in Contract Documents and applicable law respecting such materials.
3. Contractor's written notice under Paragraph 13.E.1 above shall indicate whether the hazardous waste or material was shown or indicated in Contract Documents to be within the scope of Work, and whether the hazardous waste or material was brought to the Site by Contractor, its Subcontractors, suppliers, or anyone else for whom Contractor is responsible. As used in this paragraph, "hazardous materials" shall include asbestos, lead, PCBs,

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petroleum and related hydrocarbons, and radioactive material and as defined in Health and Safety Code section 25117.

4. Contractor shall not be entitled to any adjustment in the Contract Sum or Times regarding claimed hazardous waste or materials if (1) Contractor knew of the existence of such hazardous material or hazardous waste at the time Contractor submitted its bid; or (2) Contractor should have known of the existence of such hazardous material or hazardous waste as a result of its having the responsibility to obtain additional or supplementary examinations, investigation, explorations, tests, studies and data concerning the conditions at or contiguous to the Site prior to submitting its Bid.
5. If City determines that conditions do not involve hazardous waste or hazardous materials or that no change in Contract Document terms is justified, City shall notify Contractor in writing, stating the reasons for its determination. If City and Contractor cannot agree on an adjustment in Contract Sum or Contract Times, Contractor shall proceed with the Work and as directed by City and may file a claim as provided in Part 12 of these General Conditions.
6. If Contractor does not agree to resume work based on a reasonable belief that it is unsafe, or does not agree to resume work under special conditions, City may order the disputed portion of work deleted from the Work, or performed by others, or City may invoke its right to terminate Contractor's right to proceed under Contract Documents in whole or in part. If Contractor does not agree with City's determination of any adjustment in the Contract Sum or Times as a result, Contractor may make a claim as provided in Part 12 of these General Conditions.
7. Contractor is directed to Part 9, Section A.6 of this Document 00 72 00.

F. SUSPENSION OF WORK

1. City may, without cause, order Contractor in writing to suspend, delay or interrupt Work in whole or in part for such period of time as City may determine. An adjustment shall be made for increases in cost of performance of Contract Documents caused by any such suspension, delay or interruption, calculated using the measures set forth in Document 01 25 10. No adjustment shall be made to extent: (a) that performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible; or (b) that an equitable adjustment is made or denied under another provision of Contract Documents; or (c) that the suspension of work was the direct or indirect result of Contractor's failure to perform any of its obligations hereunder. Adjustments made in cost of performance may have a mutually agreed fixed or percentage fee; if the parties cannot agree, Contractor may file a claim under Part 12 herein.

G. TERMINATION OF CONTRACT FOR CAUSE

1. Contractor shall be in default of Contract Documents and City may terminate Contractor's right to proceed under all or any part of Contract Documents, for cause:
 - a. Should Contractor make an assignment for the benefit of creditors, admit in writing its inability to pay its debts as they become due, file a voluntary petition in bankruptcy, be adjudged bankrupt or insolvent, be the subject of an involuntary petition in bankruptcy which is not dismissed within 60 days; file a petition or answer seeking for itself any reorganization, arrangement, composition, readjustment, liquidation, dissolution, or similar relief under any present or future statute, law, or regulation, filing any answer admitting or not contesting the material allegations of a petition filed against Contractor in any such proceeding, or seek, consent to, or acquiesce in, the appointment of any trustee, receiver,

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custodian or liquidator of Contractor or of all or any substantial part of its properties or if Contractor, its directors or shareholders, take action to dissolve or liquidate Contractor; or

- b. Should Contractor commit a material breach of Contract Documents and not cure such breach within ten (10) calendar days of the date of notice from City to Contractor demanding such cure; or, if such breach is curable but not curable within such ten (10) day period, within such period of time as is reasonably necessary to accomplish such cure. (In order for Contractor to avail itself of a time period in excess of 10 calendar days, Contractor must provide City within the 10 day period with a written plan acceptable to City to cure said breach, and then diligently commence and continue such cure according to the written plan); or
 - c. Should Contractor violate or allow (by a Subcontractor or other person or entity for which Contractor is responsible) a violation of any valid law, statute, regulation, rule, ordinance, permit, license or order of any governmental City applicable to the Project or Work and does not cure (or cause to be cured) such violation within ten (10) days of the date of the notice from City to Contractor demanding such cure; or, if such violation is curable but not curable within such ten (10) day period, within such period of time as is reasonably necessary to accomplish such cure. (In order for Contractor to avail itself of a time period in excess of 10 calendar days, Contractor must provide City within the 10 day period with a written plan to cure said violation acceptable to City, and then diligently commence and continue performance of such cure according to the written plan.); or
 - d. Should any material representation, warranty, declaration, certification or other statements made by Contractor in any Bidding Document or otherwise to City in connection with Contractor's obtaining or performing this Contract prove to be materially incorrect when made, or should Contractor materially breach any material agreement made in any Bidding Document.
2. If City at any time reasonably believes that Contractor is or may be in default under Contract Documents, as defined above, City may in its sole discretion notify Contractor of this fact and request written assurances from Contractor of performance of Contract Documents and a written plan from Contractor to remedy any default under the terms of Contract Documents which City may advise Contractor of in writing. Failure of Contractor to provide such written assurances of performance and the required written plan, within ten (10) calendar days of demand, will constitute a material breach of Contract Documents sufficient to justify termination for cause.
 3. In event of termination for cause, City shall immediately serve written notice thereof upon Surety and Contractor. Surety shall have the rights and obligations set forth in Document 00 61 14 Construction Performance Bond. Subject to the Surety's rights under the Performance Bond (which rights are waived upon a default thereunder), City may take over the Work and prosecute it to completion by contract or by any other methods it may deem advisable.
 4. In the event of termination by City as provided in Paragraph 13.G.1 above for cause,
 - a. City shall compensate Contractor for the value of the Work delivered to City upon termination as determined in accordance with Contract Documents, subject to all rights of offset and backcharges, and provided that Contractor provides City with updated as-builts and Project record documents showing the Work performed up to the date of termination. However, City shall not compensate Contractor for its costs in terminating the Work or any cancellation charges owed to third parties. City may use the Escrow Bid Documents and

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Schedule of Values to determine the value of the Work delivered. City's determination is final.

- b. Contractor shall deliver to City possession of the Work in its then condition, including but not limited to, all designs, engineering, Project records, cost data of all types, drawings and specifications and contracts with vendors and subcontractors, all other documentation associated with the Project, and all construction supplies and aids dedicated solely to performing the Work which, in the normal course of construction, would be consumed or only have salvage value at the end of the construction period. Contractor shall remain fully liable for the failure of any Work completed and materials and equipment provided through the date of such termination to comply with the provisions of Contract Documents. The provisions of this Paragraph shall not be interpreted to diminish any right which City may have to claim and recover damages for any breach of Contract Documents or otherwise, but rather, Contractor shall compensate City for all loss, cost, damage, expense, and/or liability suffered by City as a result of such termination and failure to comply with Contract Documents.
 - c. City shall, to the extent applicable, have all other rights and remedies set forth in any Bidding Document.
5. In the event a termination for cause is determined to have been made wrongfully or without cause, then the termination shall be treated as a termination for convenience, and Contractor shall have no greater rights than it would have had following a termination for convenience. Any Contractor claim arising out of a termination for cause shall be made in accord with the provisions of Contract Documents on claims and calculated in accordance with the provisions of Contract Documents on Change Orders and claims. No other loss cost, damage, expense or liability may be claimed, requested or recovered by Contractor.

H. TERMINATION OF CONTRACT FOR CONVENIENCE

- 1. City may terminate performance of the Work under Contract Documents in accordance with this clause in whole, or from time to time in part, whenever City shall determine that termination is in City's best interest. Termination shall be effected by City delivering to Contractor notice of termination specifying the extent to which performance of the Work under Contract Documents is terminated, and the effective date of the termination.
- 2. After receiving a notice of termination under Paragraph 13.H.1 above, and except as otherwise directed by City, Contractor shall:
 - a. Stop Work under Contract Documents on date and to extent specified in notice of termination;
 - b. Place no further orders or subcontracts for materials, services, or facilities except as necessary to complete portion of Work under Contract Documents which is not terminated;
 - c. Terminate all orders and subcontracts to extent that they relate to performance of Work terminated by the notice of termination;
 - d. Assign to City in manner, at times, and to extent directed by City, all right, title, and interest of Contractor under orders and subcontracts so terminated. City shall have the right, in its sole discretion, to settle or pay any or all claims arising out of termination of orders and subcontracts;

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- e. Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with approval or ratification of City to extent City may require. City's approval or ratification shall be final for purposes of this Paragraph;
 - f. Transfer title to City, and deliver in the manner, at the times, and to the extent, if any, directed by City, all fabricated or unfabricated parts, Work in process, completed Work, supplies, and all other material produced as part of, or acquired in connection with performance of, Work terminated by the notice of termination, and completed or partially completed drawings, drawings, specifications, information, and other property which, if the Project had been completed, would have been required to be furnished to City;
 - g. Use its best efforts to sell, in manner, at times, to extent, and at price or prices that City directs or authorizes, any property of types referred to in Paragraph 13.H.2.f. above, but Contractor shall not be required to extend credit to any purchaser, and may acquire any such property under conditions prescribed and at price or prices approved by City. Proceeds of transfer or disposition shall be applied to reduce payments to be made by City to Contractor under Contract Documents or shall otherwise be credited to the price or cost of Work covered by Contract Documents or paid in such other manner as City may direct;
 - h. Complete performance of the part of the Work which was not terminated by the notice of termination; and
 - i. Take such action as may be necessary, or as City may direct, to protect and preserve all property related to Contract Documents which is in Contractor's possession and in which City has or may acquire interest.
3. After receipt of a notice of termination, Contractor shall submit to City its termination claim, in form and with all certifications required by Part 12 herein. Contractor's termination claim shall be submitted promptly, but in no event later than thirty (30) days from effective date of the termination. Contractor and City may agree upon the whole or part of the amount or amounts to be paid to Contractor because of a total or partial termination of Work under this Paragraph 13.H. If Contractor and City fail to agree on the whole amount to be paid to Contractor because of the termination of the Work under this Paragraph 13.H, City shall determine, based on information available to it, the amount, if any, due to Contractor by reason of the termination and shall pay to Contractor for Work specified in Contract Documents which is performed before the effective date of the termination, the total (without duplication of any items) of -
- a. The reasonable cost to Contractor, without profit, for all Work performed prior to the effective date of the termination, including Work done to secure the Project for termination. In determining reasonable cost, deductions will be made for cost of materials to be retained by Contractor, cost of work defectively performed, amounts realized by sale of materials, and for other appropriate credits against cost of Work. Reasonable cost will include reasonable allowance for Project overhead and general administrative overhead not to exceed a total of 10 percent of direct costs of such work.
 - b. When, in City's opinion, the cost of any item of Work is excessively high due to costs incurred to remedy or replace defective or rejected Work, reasonable cost to be allowed will be the estimated reasonable cost of performing the Work in compliance with requirements of Contract Documents and excessive actual cost shall be disallowed.
 - c. A reasonable allowance for profit on cost of Work performed as determined under Paragraph 13.H.3.a, provided that Contractor establishes to City's satisfaction that

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Contractor would have made a profit had the Project been completed, and provided further that the profit allowed shall not exceed 5 percent of cost.

- d. Reasonable costs to Contractor of handling material returned to vendors, delivered to City or otherwise disposed of as directed by City.
 - e. A reasonable allowance for Contractor's internal administrative costs in preparing termination claim.
 - f. City shall have no obligation to pay Contractor under this Paragraph 13.H unless and until Contractor provides City with updated and acceptable as-builts and Project record documents for Work completed prior to termination.
4. Except as provided above, City shall not be liable for costs incurred by Contractor or subcontractors after receipt of a notice of termination. Such non-recoverable costs include, but are not limited to, anticipated profits on Work not performed as of the date of termination, post-termination employee salaries, post-termination general administrative expenses, post-termination overhead or unabsorbed overhead, damages from lost bonding capacity, lost profits on other work, lost opportunities, costs of preparing and submitting Contractor's Bid, attorney's fees of any type, and all other costs relating to prosecution of claim or lawsuit.
5. In arriving at the amount due Contractor under this clause there shall be deducted: (a) All unliquidated advances or other payments on account previously made to Contractor which are applicable to the terminated portion of Contract Documents; (b) any claim which City may have against Contractor in connection with Contract Documents; and (c) the agreed price for, or proceeds of sale of, any materials, supplies, or other things kept by Contractor or sold under provisions of Paragraph 13.H, and not otherwise recovered by or credited to City.

I. CONTINGENT ASSIGNMENT OF SUBCONTRACTS

1. Contractor hereby assigns to City each Subcontract for a portion of the Work, provided that:
- a. The assignment is effective only after City's termination of Contractor's right to proceed under Contract Documents (or portion thereof relating to that Subcontract) pursuant to Paragraphs 13.G or 13.H above.
 - b. The Assignment is effective only for the Subcontracts which City expressly accepts by notifying the Subcontractor in writing;
 - c. Except for the written notice described above, no other action shall be required of City or Contractor to effectuate a reassignment of a contract to City;
 - d. The assignment is subject to the prior rights, if any, of the Surety, obligated by the Performance Bond provided under Contract Documents, where the Surety exercises its rights to complete the Contract;
 - e. After the effectiveness of an assignment, Contractor shall, at its sole cost and expense (except as otherwise provided in Paragraphs 13.G or 13.H above), sign all instruments and take all actions reasonably requested by City to evidence and confirm the effectiveness of the assignment in City; and
 - f. Nothing in this Paragraph 13.I shall modify or limit any of Contractor's obligations to City arising from acts or omissions occurring before the effectiveness of any Subcontract assignment, including but not limited to all defense, indemnity and hold harmless obligations arising from or related to the assigned Subcontract.

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J. REMEDIES

1. Subject to Contract Documents provisions regarding Contractor claims, claim review, and claim resolution, and subject to the limitations therein, the exclusive jurisdiction and venue for resolving all claims, counter-claims, disputes and other matters in question between City and Contractor arising out of or relating to Contract Documents, any breach thereof or the Project shall be the applicable court of competent jurisdiction located in the State of California, County of Contra Costa. All City remedies provided in Contract Documents shall be taken and construed as cumulative and not exclusive; that is, in addition to each and every other remedy herein provided; and in all instances City shall have any and all other equitable and legal rights and remedies which it would have according to law.

K. PATENTS

1. Fees or claims for any patented invention, licenses, article or arrangement that may be used upon or in any manner connected with performance of the Work or any part thereof shall be included in the Bid price for doing the Work. Contractor shall defend, indemnify and hold harmless City and each of its officers, employees, consultants and agents, including, but not limited to, the City Council, and each City representative, from all damages, claims for damages, costs or expenses in law or equity, including attorney's fees, arising from or relating to any claim that any article supplied or to be supplied under Contract Documents infringes on the patent rights, copyright, licenses, trade name, trademark, service mark, trade secret or other intellectual property right of any person or persons or that the person or entity supplying the article does not have a lawful right to sell the same. Such costs or expenses for which Contractor agrees to indemnify and hold harmless the above indemnities include but are not limited to any and all license fees, whether such fees are agreed by any indemnitee or ordered by a court or administrative body of any competent jurisdiction.

L. SUBSTITUTION FOR PATENTED AND SPECIFIED ARTICLES

1. Pursuant to Public Contract Code Section 3400(b), City may make a finding that is described in the invitation for bids that designates certain products, things, or services, by specific brand or trade name.
2. Unless specifically designated in the Contract Documents, whenever any material, process, or article is indicated or specified by grade, patent, or proprietary name or by name of manufacturer, such specifications shall be deemed to be used for the purpose of facilitating the description of same, and shall be deemed to be followed by the words "or approved equal." Unless otherwise stated, Contractor may offer for substitution any material, process, or article which shall be substantially equal or better in every respect to that so specified in the Contract Documents. However, City may have adopted certain uniform standards for certain materials, processes, and articles.
3. Contractor shall submit requests together with substantiating data for substitution of any "equal" material, process, or article no later than fourteen (14) days after award of the Contract. To facilitate the construction schedule and sequencing, some requests may need to be submitted before fourteen (14) days after award. Provisions regarding submission of "equal" requests shall not in any way authorize an extension of time for performance of this Contract. If a proposed substitution request is rejected, Contractor shall be responsible for providing the specified material, process, or article. The burden of proof as to the equality of any substitution shall rest with Contractor. City has the complete and sole discretion to determine if a proposed substitution is "equal."

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4. Data required to substantiate requests for substitution shall include a signed affidavit from the Contractor stating and describing how the “equal” material, process, or article is equivalent to that specified in every way except as listed on the affidavit. Substantiating data shall include any and all illustrations, specifications, and other relevant data including catalog information, which describes the requested substitution and substantiates that it is an “equal” material, process, or article. The substantiating data must also include information regarding the durability and lifecycle cost of the requested substitution. Failure to submit the affidavit and all the required data to City in a timely manner will result in the rejection of the proposed substitution.
5. Contractor shall bear all costs related to a substituted “equal” material, process, or article, including all of City’s costs associated with the review of the substitution request prior to approval and the coordination after approval.
6. City has not made any findings pursuant to Public Contract Code Section 3400.

M. LIMIT OF LIABILITY

1. CITY AND EACH OF ITS OFFICERS, MAYOR, CITY COUNCIL, EMPLOYEES, CONSULTANTS AND AGENTS INCLUDING, BUT NOT LIMITED TO, EACH CITY REPRESENTATIVE SHALL HAVE NO LIABILITY TO CONTRACTOR FOR SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES, EXCEPT TO THE LIMITED EXTENT THAT THESE CONTRACT DOCUMENTS OR APPLICABLE PUBLIC CONTRACTING STATUTES MAY SPECIFY THEIR RECOVERY.

N. SEVERABILITY

1. Any provisions or portions thereof of Contract Documents which are prohibited by, unlawful, or unenforceable under any applicable law of any jurisdiction shall as to such jurisdiction be ineffective without affecting other provisions or portions thereof in Contract Documents.

PART 14. MODIFICATIONS OF CONTRACT DOCUMENTS

A. ALTERATIONS, MODIFICATIONS AND FORCE ACCOUNT WORK

1. No modification or deviation from the Drawings and Specifications shall be permitted except by written Contract Modification.
2. City may, without notice to the sureties, make alterations, deviations, additions to, or deletions from Contract Documents; increase or decrease the quantity of any item or portion of the Work; change the Contract Times; delete any item or portion of the Work; and require extra work. Contractor shall perform such work under applicable provisions of Contract Documents, unless specifically provided otherwise at the time the change is ordered. In the case of any ordered extra work, City reserves the right to furnish all or portions of associated labor, material, and equipment, which Contractor shall accept and use without payment for costs, markup, profit, or otherwise for such City-furnished labor, materials, and equipment.
3. Changes affecting time or price of the Work shall be set forth in a written Change Order that shall specify: (1) the work performed in connection with the change to be made; (2) the amount of the adjustment of the Contract price, if any, and the basis for compensation for the work ordered; and (3) the extent of the adjustment in the Contract time, if any. A Change Order will not become effective until signed by City. No changes or deviations from Contract Documents affecting time or price of the Work will be made without the authority of an approved Change Order, except in cases of emergency discussed herein.
4. Changes not affecting the time or price of the Work, in City’s discretion, may be set forth in a

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written Field Directive (FD), Request for Information (RFI), or other written form approved and executed by the City. Acceptance of such FD and RFI constitutes Contractor's agreement to make the specified change without change to the Contract Price or the Contract Times. City may issue FD as preliminary instructions to Contractors in anticipation of a subsequent Change Order.

5. (Blank.)
6. Contractor in accordance with Contract Documents shall diligently carry out all Change Orders. If changes ordered in design, workmanship or materials are of such a nature as to increase or decrease the cost of any part of the Work, the price fixed in Contract Documents shall be increased or decreased by the amount that Contractor and City may agree upon as a reasonable and proper allowance for the cost increase or decrease. If an agreement cannot be reached, then City shall reach a determination, which shall be final, subject to Contractor's rights under Part 12 of these General Conditions. In all cases Contractor shall perform the changed Work as directed by City subject to Contractor's rights under Part 12 "Claims by Contractor" of these General Conditions. In the event the City exercises its rights to decide disputed issues pertaining to changed Work, as set forth above, then the resulting Change Order shall be effective when signed by the City and notwithstanding the fact that the Contractor has not signed it.
7. Contractor shall, upon City's request, permit inspection of the original unaltered Project Bid estimate, subcontract agreements, purchase orders relating to the change, certified payrolls and statements of fringe benefits, and documents substantiating all costs associated with the cost proposal.
8. Changes in the Work made pursuant to this Paragraph and extensions of Contract Time necessary by reason thereof shall not in any way release the guarantees/warranties given by Contractor pursuant to provisions of Contract Documents, nor shall such changes in the Work relieve or release the Sureties of bonds executed pursuant to said provisions. The Sureties, in executing such bonds, shall be deemed to have expressly agreed to any such change in the Work and to any extension of time made by reason thereof.
9. Procedures for Modifications of Contract Documents and for calculating the cost of extra work are given in Section 01 25 10 of these Specifications. Regarding delay and impact costs of any nature, Contractor may not seek delay compensation for on-site or off-site costs based on formulas, e.g., "Eichleay" or other formula. Rather, Contractor must prove actual costs resulting from such delays. If Contractor requests compensation for delay to the construction, then Contractor must prove and document actual costs plus markup per the cost categories and procedures in Section 01 25 10 in order to request, claim or prove compensation for delay.

B. ENTIRE AGREEMENT

1. Contract Documents and any Contract Modifications shall represent the entire and integrated agreement between City and Contractor regarding the subject matters hereof and thereof and shall constitute the exclusive statement of the terms of the parties' agreement. Contract Documents and any Contract Modifications shall supersede any and all prior negotiations, representations or agreements, written or oral, express or implied, that relate in any way to the subject matter of Contract Documents or written modifications. City and Contractor represent and agree that, except as otherwise expressly provided in Contract Documents, they are entering into Contract Documents and any subsequent written modification in sole reliance upon the information set forth or referenced in Contract Documents or Contract Modifications and the parties are not and will not rely on any other information.

C. EFFECT OF WAIVERS

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1. Either party's waiver of any breach or failure to enforce any of the terms, covenants, conditions or other provisions of Contract Documents at any time shall not in any way affect, limit, modify or waive that party's right thereafter to enforce or compel strict compliance with every term, covenant, condition or other provision hereof, any course of dealing or custom of the trade or oral representations notwithstanding.

PART 15. TIME ALLOWANCES

A. TIME ALLOWANCES FOR PERFORMANCE OF CONTRACT DOCUMENTS

1. When Contractor and City have signed the Contract Documents, City will serve a Notice to Proceed upon Contractor to that effect.
2. The start date for Contract Times shall be as provided in Part 3.B of these General Conditions. The date for final completion of the Work under Contract Documents shall be as provided in Document 00 52 10, "Agreement".

B. CHANGE OF CONTRACT TIMES

1. The Contract Times may only be changed by Change Order, and all time limits stated in Contract Documents are of the essence of Contract Documents. The Contract Times will be adjusted in an amount equal to the time agreed by City and Contractor to be that lost due to:
 - a. Changes in the Work ordered by City;
 - b. Fires, floods, epidemics, abnormal weather conditions, earthquakes, civil or labor disturbances, strikes or acts of God, provided delays resulting therefrom are not the result of Contractor's failure to protect the Work as required by Contract Documents. The Contract Times shall not be extended for such causes, however, unless Contractor actually has been prevented from completing any part of the Work within the Contract Time due to delay meeting all of the following conditions:
 - i. Delay is beyond Contractor's control and due to reasons for which Contractor is not responsible;
 - ii. A claim for delay is made as provided herein; and
 - iii. Contractor demonstrates actual delay to work activities that actually delay the progress of the Work in the amount of time requested.

Delays attributable to and within the control of a subcontractor, or its subcontractors, or supplier shall be deemed to be delays within the control of Contractor.

2. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of both City and Contractor (including, but not limited to, abnormal or adverse weather of all types within or beyond the parameters referenced below and acts of other contractors or utilities), an extension of Contract Times, in an amount equal to the time lost due to such delay without any other form of compensation, shall be Contractor's sole and exclusive remedy for such delay.
3. Contractor must present as its claims, all subcontractor and supplier claims of any type, and prove them under the terms of the Contract Documents. City shall not be directly liable to any Subcontractor, any supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages or extra costs of any type arising out of or

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resulting from the Project, including without limitation: (a) delays caused by or within the control of Contractor, (b) changes in the Work ordered by City or any City representative, (c) acts or neglect by City, utility owners or other contractors performing other work, (d) fires, floods, abnormal weather conditions, earthquakes, civil or labor disturbances, strikes or acts of God, (e) other contractors performing other work as contemplated by Paragraph 6, or (f) claimed deficiencies in Project design.

4. Delays due to adverse weather conditions may be allowed only if Contractor proves that abnormal weather actually caused critical project delays. Contractor shall provide written notice of intent to claim an abnormal weather day within one day of the adverse weather day occurring.
5. Delays due to abnormal or adverse weather conditions shall not be a prima facie reason for an extension of Contract Times. Contractor shall make every effort to continue Work under prevailing conditions. Delays due to abnormal or adverse weather conditions will be allowed provided Contractor can prove abnormal or adverse weather conditions at the Site prevented the Contractor from proceeding with seventy-five percent (75%) of the scheduled crew, labor, and equipment resources engaged on critical path activities identified on the accepted and most current progress schedule update at the time of the abnormal or adverse weather condition, and 75% of the crew did not work five (5) hours or more. Abnormal or adverse weather delays meeting the criteria in this paragraph are deemed beyond the control of both City and Contractor, and an extension of Contract Times (or milestones) due to such a delay shall be the Contractor's sole and exclusive remedy for such a delay.
6. Rain delay shall be recognized for the actual period of time Contractor proves it was delayed by rain in accordance with the above parameters and requirements. For example, and not by way of limitation, if rain exceeding the specified parameters does not in fact delay Contractor's progress on the critical path, then no time extension shall be recognized.
7. Contractor shall take reasonable steps to mitigate potential weather delays, such as dewatering the Site, providing access roads un-impacted by abnormal or adverse weather and covering work and material that could be affected adversely by weather. Failure to do so shall be cause for City to not grant a time extension due to abnormal or adverse weather, where Contractor could have avoided or mitigated the potential delay by exercising reasonable care.

C. NOTICE OF DELAY

1. Within seven (7) calendar days of the beginning of any delay Contractor shall notify City in writing, by submitting a notice of potential claim, of all anticipated delays resulting from the delay event in question. Any request for extension of time shall be accompanied by Contractor's written statement that the adjustment claimed is the entire adjustment to which the claimant is entitled as a result of the occurrence of said event. City shall determine all claims and adjustments in the Contract Times. No claim for an adjustment in the Contract Times will be valid and such claim will be waived if not submitted in accordance with the requirements of this paragraph.

D. NO DAMAGES FOR DELAY CAUSED BY CONTRACTOR

1. Contractor shall not be entitled to any time extension or compensation, including but not limited to extended field or home office overhead, field supervision, costs of capital, interest, escalation charges, acceleration costs or other impacts for any delays caused in whole or in part by Contractor's failure to perform its obligations under Contract Documents, or during

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periods of delay concurrently caused by Contractor and either City or others. Contractor may receive time extension and be compensated for delays caused directly and solely by City except that Contractor shall not be entitled to damages for delay to the Work caused by the following reasons:

- a. City's right to sequence the Work in a manner which would avoid disruption to City's tenants and their contractors or other prime contractors and their respective subcontractors, exercised as a result of Contractor's failure to perform its cooperation and coordination responsibilities required by Contract Documents, City's enforcement of any government act or regulation, or the provisions of Contract Documents.
- b. For changed site conditions that are beyond the parties' contemplation, except that City may approve direct costs associated with unknown conditions (but not costs or damages which result from such delays); and
- c. Extensive requests for clarifications to Contract Documents or modifications thereto, provided such clarifications or modifications are processed by City or its consultants in a reasonable time commensurate with Contract Documents requirements.
- d. Extensive requests for clarifications that could be reasonably construed as frivolous in an attempt to create delay. Requests shall be considered frivolous when the response could have been readily derived from standard practice or common knowledge of the industry, or knowledge, qualification, and experience of the trade, which are prerequisites of the Contractor entering into this Contract. Requests shall also be construed as frivolous if the nature and quantity of information sought are above and beyond what would be considered to be necessary by common practice and industry standards.
- e. Delay inferred from an assumed production rate by the Contractor when such production rate has not been demonstrated by actual work progress.

E. LIQUIDATED DAMAGES

The provisions of Section 8-10 "Liquidated Damages" of the General Provisions of the Standard Specifications shall apply in its entirety and as supplemented in other related sections of these Specifications.

PART 16. WORKING CONDITIONS AND PREVAILING WAGES

A. USE OF SITE/SANITARY RULES

1. All portions of the Work shall be maintained at all times in neat, clean and sanitary condition.
2. Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Site (when applicable) and land areas identified in and permitted by Contract Documents and other land and areas permitted by applicable laws and regulations, rights of way, permits and easements or as designated by City, and shall not encumber the Lafayette Community Center premises with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, any improvement located thereon, or to the owner or occupant thereof resulting from the performance of Work.
3. During the progress of the Work, Contractor shall keep the restrooms (Site) and the Lafayette Community Center free from accumulations of waste materials, rubbish and other debris

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resulting from the Work. On a daily basis, contractor shall clean any and all dirt, and debris throughout the path of travel and vicinity in the hallways and parking lot. At the completion of the Work, Contractor shall remove all waste materials, rubbish and debris from and about the Site as well as all tools, appliances, construction equipment and machinery and surplus materials. Contractor shall leave the premises clean and ready for occupancy by City at Substantial Completion of Work. Contractor shall restore to original condition all property not designated for alteration by Contract Documents.

4. Contractor shall not load nor permit any part of any structure or pavement to be loaded in any manner that will endanger the structure or pavement, nor shall Contractor subject any part of Work or adjacent property to stresses or pressures that will endanger it. Contractor shall conduct all necessary existing conditions investigation regarding structural, mechanical, electrical or any other system existing, shall perform its work consistent with such existing conditions, and shall have full responsibility for insufficiencies or damage resulting from insufficiencies of existing systems, equipment or structures to accommodate performing the Work.

B. PROTECTION OF WORK, PERSONS AND PROPERTY

1. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with Work. Contractor shall comply with all safety requirements specified in any safety program established by City, or required by state, federal or local laws and ordinances. Contractor shall also comply with the latest requirements as outlined by the State of California and Contra Costa Department of Public Health, and CAL OSHA to prevent spread of COVID 19 Virus. Contractor must have a daily checklist for the crew, a sample checklist is included in the Appendix.
2. Section 22 of the Technical Provisions of the Standard Specifications shall apply. Contractor shall be responsible for all damage to Work, property or structures, and all injuries to persons, arising from the performance of Contract Documents.
 - a. Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection
 - b. Contractor shall remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, supplier, or any other person or organization directly or indirectly employed by any of them to perform or furnish any Work or anyone for whose acts any of them may be liable. Contractor's duties and responsibility for safety and for protection of Work shall continue until such time as all the Work is completed and Final Acceptance of the Work. City and of its agents do not assume any responsibility for collecting any indemnity from any person or persons causing damage to Contractor's work.
 - c. Contractor shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs, including enforcement of the requirements to prevent spread of COVID 19 virus
 - d. City may, at its option, retain such moneys due under Contract Documents as City deems necessary until any and all suits or claims against Contractor for injury to persons or property shall be settled and City receives satisfactory evidence to that effect.

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C. RESPONSIBILITY FOR SAFETY AND HEALTH

1. Contractor shall ensure that its and each tier of subcontractors' employees, agents and invitees comply with applicable health and safety laws while at the Site. These laws include the Occupational Safety and Health Act of 1970 and rules and regulations issued pursuant thereto, and City's safety regulations as amended from time to time. Contractor shall comply with all City directions regarding protective clothing, surgical mask, and all other necessary and required gears to enter the Community Center premises and job site.
2. Contractor shall be fully responsible for the safety of its and its subcontractors' employees, agents and invitees on the Site. Contractor shall notify City, in writing, of the existence of hazardous conditions, property or equipment at the Site that are not under Contractor's control. Contractor shall be responsible for taking all the necessary precautions against injury to persons or damage to the property of Contractor, subcontractors or persons from recognized hazards until the responsible party corrects the hazard.
3. Contractor shall confine all persons acting on its or its subcontractors' behalf to that portion of the Site where Work under Contract Documents is to be performed: City designated routes for ingress and egress thereto; and any other City designated area. Except those routes for ingress and egress over which Contractor has no right of control, within such areas, Contractor shall provide safe means of access to all places at which persons may at any time have occasion to be present.

D. EMERGENCIES

1. In emergencies affecting the safety or protection of persons or Work or property at the Site or adjacent thereto, Contractor, without special instruction or authorization from City, is obligated to act to prevent threat and damage, injury or loss, until directed otherwise by City. Contractor shall give City prompt written notice if Contractor believes that any significant changes in Work or variations from Contract Documents have been caused thereby. If City determines that a change in Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Change Order or Construction Change Directive will be issued to document the consequences of such action.

E. USE OF ROADWAYS AND WALKWAYS, , PARKING LOT & PARKING STRUCTURE

1. Sections 6-12, 6-13, and 6-14 of the General Provisions of the Standard Specifications shall apply.
 - a. Construction impacting traffic on adjacent roadways shall be scheduled to avoid peak traffic times. complete parking lot closures at the Lafayette community center., are not allowed prior to 8 a.m. or after 5:30 p.m.
 - b. Contractor shall coordinate activities that impact the full usage of the parking lot to minimize disruption to their on-going operations. Contractor's attention is also directed to Part 10.F "Contractor's Use of the Site" of these General Conditions.
2. Unless otherwise provided in Contract Documents, Contractor shall bear the cost of complying with this Paragraph E.

F. NONDISCRIMINATION

1. Contractor shall not discriminate in the employment of persons upon public works because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, sexual preference, or gender of such persons.

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G. LABOR CODE COMPLIANCE

1. Contractor is aware of the requirements of Labor Code Sections 1720 et seq. and 1770 et seq., as well as California Code of Regulations, Title 8, Section 1600 et seq. (Prevailing Wage Laws), which require the payment of prevailing wage rates and the performance of other requirements on certain public works projects. Since this Contract involves an applicable public works project as defined by said laws with total compensation being \$1,000 or more, Contractor agrees to fully comply with said laws. Contractor shall obtain a copy of the prevailing rates of per diem wages from City or at <http://www.dir.ca.gov/dlsr> and make available to interested parties upon request copies of the rates for each craft and classification of worker needed to perform work on the Project. Contractor shall post these copies at his principal place of business and at the Project site. Contractor shall indemnify and hold City, its elected officials, officers, employees, and agents free and harmless from any claims, liabilities, costs, penalties, or interest arising out of any failure or alleged failure to comply with the Prevailing Wage Laws.
2. Contractor and each subcontractor shall forfeit as a penalty to City two hundred dollars (\$200.00) for each calendar day, or portion thereof, for each worker paid less than the stipulated prevailing wage rate for any work done by him, or by any subcontract under him, in violation of the Labor Code. The sums and amounts which shall be forfeited pursuant to this Paragraph 16.G.2 and the terms of the Labor Code shall be withheld and retained from payments due to Contractor under Contract Documents, pursuant to this Document 00 72 00, "General Conditions," and the Labor Code, but no sum shall be so withheld, retained or forfeited except from the final payment without a full investigation by either the State Department of Industrial Relations or by City. The Labor Commissioner pursuant to Labor Code section 1775 shall determine the final amount of forfeiture.
3. Contractor shall insert in every subcontract or other arrangement which Contractor may make for performance of work or labor on Work provided for in the Contract, provision that subcontractor shall pay persons performing labor or rendering service under subcontract or other arrangement not less than the general prevailing rate of per diem wages for work for work of a similar character in the locality in which the Work is performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work fixed in the Labor Code. Contractor stipulates that it shall comply with all applicable wages and hour laws, including without limitation Labor Code Section 1813.
4. Pursuant to Labor Code Section 1776, Contractor and each subcontractor shall maintain weekly certified payroll records showing the name, address, social security number, classification, and hours and wages paid each day for each worker employed in connection with the Work. Contractor shall certify under penalty of perjury that records maintained and submitted by Contractor are true and accurate.
 - a. Certified copies of the employee's payroll records shall be made available for inspection by the employee or his authorized representative and the Department of Industrial Relations upon request.
 - b. Copies of records shall be made available for inspection by City within 48 hours of a request. Copies made available to the public shall have the employee's name, address, and social security number obliterated to prevent disclosure of said information.
 - c. In the event of noncompliance with the requirements of this section by Contractor, Contractor shall have ten (10) days subsequent to receipt of written notice specifying any actions necessary to comply. If noncompliance persists after this period, Contractor shall forfeit to City as a penalty one hundred dollars (\$100) for each day, or portion thereof, for

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each worker, until strict compliance is effectuated. Such penalties shall be withheld from contract payments due Contractor.

H. ENVIRONMENTAL CONTROLS

1. Contractor shall comply with all rules, regulations, ordinances and statutes that apply to any work performed under Contract Documents including, without limitation, any toxic, water and soil pollution controls and air pollution controls specified in Government Code, Section 11017. Contractor shall be responsible for insuring that Contractor's employees, subcontractors and the public are protected from exposure to airborne hazards or contaminated water, soil or other toxic materials used during or generated by activities on the Site or associated with the Project. Contractor is directed to Part 9 Section A.6 of this Document 00 72 00.
2. Section 6-21 of the General Provisions of the Standard Specifications shall apply. Additionally:
 - a. Construction equipment shall be cleaned and maintained in a state to prevent dust pollution and tracking of debris onto adjacent properties and streets.
 - b. Construction equipment shall be fitted with exhaust muffling and filter devices and be well maintained in a state to minimize emission pollutants to the maximum extent practicable.
 - c. Construction equipment shall be fitted with noise control devices to minimize construction noise to the maximum extent practicable.
 - d. Contractor shall comply fully with the requirements of stormwater pollution control. Contractor shall comply fully with said provisions as part of Contract Work. See Appendix A. Any conflicts between these provisions and other referenced specifications and standards within the Contract Documents shall be interpreted to require the Contractor to perform the strictest, highest quality, and/or highest cost option.

END OF DOCUMENT

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DOCUMENT 00 73 15

INSURANCE

1. GENERAL INFORMATION

- A. Definitions. For the purpose of this Document 00 73 15, the terms “personal injury” and “injury to a person” or similar terms include, without limitation, death resulting therefrom and shall not be limited to bodily injury.
- B. Insurance Requirements. Prior to commencement of any Work under the Contract Documents, and any extension thereof, Contractor shall, at its sole cost and expense, purchase and maintain in full force not less than the minimum insurance coverage and limits of insurance with the endorsements and deductibles indicated in this Document 00 73 15. Such insurance coverage shall be maintained with insurers and under forms of policies satisfactory to City and otherwise as described in this Document 00 73 15 until Final Acceptance of the Work except as stated in 3.C below. The certificates and endorsements for each insurance policy shall be signed by a person authorized by that insurer to bind coverage on its behalf, and shall be on forms acceptable to the City. All certificates and endorsements must be received and approved by the City before Work commences. Failure to provide and maintain all required insurance shall be grounds for the City to terminate this Contract for cause.

2. WORKERS' COMPENSATION INSURANCE OR SECURITY

- A. Contractor's Requirements. In accordance with the provisions of the Labor Code, Contractor is required to secure the payment of compensation to its employees and shall for that purpose obtain and keep in effect adequate workers' compensation insurance.
- B. Contractor's Compliance. Contractor shall meet the provisions of Section 3700 of the California Labor Code, which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of said Code. Contractor shall comply with such provisions before commencing the performance of the Work included in the Contract Documents.
- C. Coverage
- a. Full workers' compensation insurance and employer's liability with limits of at least, one million dollars (\$1,000,000) Policy limit Bodily Injury by disease, one million dollars (\$1,000,000) each accident/Bodily Injury and one million dollars (\$1,000,000) each employee Bodily Injury by disease, with an insurance carrier satisfactory to City.
 - i. Statutory Workers Compensation Coverage A
 - ii. Employer's Liability Insurance Coverage B. Not less than one million dollars (\$1,000,000) each accident/Bodily Injury, one million dollars (\$1,000,000) policy limit Bodily Injury by disease and one million dollars (\$1,000,000) each employee Bodily Injury by disease.
 - b. In the event Contractor is self-insured, Contractor shall furnish Certificate of Permission to Self-Insure, signed by the Department of Industrial Relations Administration of Self-Insurance, Sacramento.
 - c. If any injury occurs to any employee of Contractor for which the employee, or employee's

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dependents in the event of employee's death, is entitled to compensation from City under the provisions of Division 4 (commencing with Section 3201 and hereinafter referred to as "Act") of the Labor Code, or for which compensation is claimed from City, City may retain, out of sums due Contractor under the Contract Documents, an amount sufficient to cover such compensation as fixed by said Act until such compensation is paid, or until it is determined that no compensation is due. If City is compelled to pay such compensation, it will deduct and retain from such sums due Contractor the amount so paid.

- d. In case of any sublet Work, the Contractor shall require the subcontractor similarly to provide workers' compensation insurance for all the latter's employees as prescribed by State law. Any class of employee or employees not covered by a subcontractor's insurance shall be covered by the Contractor's insurance. In case any class of employees engaged in work under this Contract, on or at the Site, is not protected under the Workers' Compensation Statutes, the Contractor shall provide or shall cause a subcontractor to provide, adequate insurance coverage for the protection of such employees not otherwise protected.
- e. Contractor's employer's liability policy shall be endorsed, if applicable, to provide a Borrowed Servant/Alternate Employer Endorsement and contain a Waiver of Subrogation in favor of the City.

D. Indemnification. The indemnification and hold harmless obligations of Contractor under the Contract Documents shall not be limited in any way by any limitation on the amount or type of damage, compensation or benefit payable by or for Contractor or any subcontractor under Worker's Compensation Acts, Disability Benefits Acts or other employee benefits acts.

3. COMMERCIAL GENERAL LIABILITY INSURANCE

- A. Coverage for Commercial General Liability Insurance, Combined Single Limit Liability. The policy shall provide limits of liability of not less than:
 - a. Contractor shall provide "occurrence" form Commercial General Liability insurance coverage at least as broad as the most current ISO CGL Form 00 01, including but not limited to, premises liability, contractual liability, products/completed operations, personal and advertising injury which may arise from or out of Contractor's operations, use, and management of the Site, or the performance of its obligations hereunder. The policy shall not contain any exclusion contrary to this Contract including but not limited to endorsements or provisions limiting coverage for (1) contractual liability (including but not limited to ISO CG 24 26 or 21 39); or (2) cross-liability for claims or suits against one insured against another. Policy limits shall not be less than \$3,000,000 per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit. Defense costs shall be paid in addition to the limits.
 - b. Such policy shall comply with all the requirements of this Document 00 73 15. The limits set forth herein shall apply separately to each insured against whom claims are made or suits are brought, except with respect to the limits of liability. Further the limits set forth herein shall not be construed to relieve the Contractor from liability in excess of such coverage, nor shall it limit Contractor's indemnification obligations to the City, and shall not preclude the City from taking such other actions available to the City under other provisions of the Contract Documents or law.

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- c. All general liability policies shall be written to apply to all bodily injury, including death, property damage, personal injury, owned and non-owned equipment, blanket contractual liability, completed operations liability, explosion, collapse, under-ground excavation, removal of lateral support, and other covered loss, however occasioned, occurring during the policy term, and shall specifically insure the performance by Contractor of that part of the indemnification contained in the Contract Documents relating to liability for injury to or death of persons and damage to property.
 - d. If the coverage contains one or more aggregate limits, a minimum of 50% of any such aggregate limit must remain available at all times; if over 50% of any aggregate limit has been paid or reserved, the City may require additional coverage to be purchased by Contractor to restore the required limits. Contractor may combine primary, umbrella, and as broad as possible excess liability coverage to achieve the total limits indicated above. Any umbrella or excess liability policy shall include the additional insured endorsement described in the Contract Documents.
 - e. All policies of general liability insurance shall permit and Contractor does hereby waive any right of subrogation which any insurer of Contractor may acquire from Contractor by virtue of the payment of any loss.
 - f. The indemnification and hold harmless obligations of Contractor under the Contract Documents shall not be limited in any way by any limitation on the amount or type of damage, compensation or benefit payable by or for Contractor or any subcontractor under any insurance policy.
- B. Deductibles and Self Retentions. Deductibles shall be not greater than twenty-five thousand dollars (\$25,000); Self Retentions shall not be greater than twenty-five thousand dollars (\$25,000).
- C. Continuing Coverage. Contractor shall maintain in full force the Commercial General Liability Insurance specified herein after Final Acceptance of work for the entire statutory period for bringing claims, or ten (10) years, whichever is less.

4. COMPREHENSIVE AUTOMOBILE LIABILITY POLICY

- A. Comprehensive Automobile Liability Insurance Coverage. Contractor shall provide "occurrence" form Automobile Liability Insurance at least as broad as ISO CA 00 01 (Any Auto). The policy shall provide limits of liability of not less than:
- a. A minimum combined single limit of not less than three million dollars (\$3,000,000) each occurrence, for bodily injury and/or property damage for loss arising from personal injury (as defined herein above) and/or property damage applicable to vehicle used in pursuit of any activities associated with the Contract Documents.
 - b. Such insurance shall provide coverage with respect to the ownership, operation, maintenance, use, loading or unloading of any auto owned, leased, hired or borrowed by Contractor or for which Contractor is responsible, in a form and with insurance companies acceptable to the City. All policies of automobile insurance shall permit and Contractor does hereby waive any right of subrogation which any insurer of Contractor may acquire from Contractor by virtue of the payment of any loss.
- B. Scheduled Vehicles Restriction. Contractor shall not provide a Comprehensive Automobile Liability policy specifying scheduled vehicles without the express written consent of City.

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5. ALL-RISK COURSE OF CONSTRUCTION INSURANCE

- A. Contractor shall purchase and maintain a policy course of construction insurance on an “all risk” form, including the perils of collapse, in the amount at least equal to the contract sum and subsequent modifications to the contract sum. The insurance shall be in an amount to cover 100% of the replacement cost of the entire Work, including any and all materials, portions of the Work located off-site but intended for use at the site, Work in transit, scaffolding, falsework and temporary structures, at replacement cost. Costs of debris removal shall also be covered. Contractor shall also maintain coverage for boiler and machinery covering insured objects during installation and until final acceptance. The builder’s risk coverages shall name the City, Contractor and all subcontractors as insureds with respect to their interests. The policy shall contain a waiver of subrogation in favor of all insureds on the policy. The builder’s risk policy shall have a maximum deductible of fifty thousand dollars (\$50,000) per occurrence. Contractor shall be responsible for paying all deductible amounts.
- B. The named insureds shall be Contractor, all subcontractors of any tier (excluding those solely responsible for design work), suppliers, and City, its elected officials, officers, employees, agents and authorized volunteers, as their interests may appear. Contractor shall not be required to maintain property insurance for any portion of the Work following acceptance by City.
- C. The policy shall be provided for replacement value on an “all risk” basis. There shall be no coinsurance penalty provision in any such policy. The policy must include: (1) coverage for any ensuing loss from faulty workmanship, nonconforming work, omission or deficiency in design or specifications; (2) coverage against machinery accidents and operational testing; (3) coverage for removal of debris, and insuring the buildings, structures, machinery, equipment, materials, facilities, fixtures and all other properties constituting a part of the Project; (4) transit coverage, including ocean marine coverage (unless insured by the supplier), with sub-limits sufficient to insure the full replacement value of any key equipment item; and (5) coverage with sub-limits sufficient to insure the full replacement value of any property or equipment stored either on or off the Site. Such insurance shall be on a form acceptable to City to ensure adequacy and sublimit.
- D. In addition, the policy shall meet the following requirements:
 - 1. Insurance policies shall be so conditioned as to cover the performance of any extra work performed under the Contract.
 - 2. Coverage shall include all materials stored on site and in transit.
 - 3. Coverage shall include Contractor’s tools and equipment.
 - 4. Insurance shall include boiler, machinery and material hoist coverage.

6. ADDITIONAL REQUIREMENTS

- A. The carrying of the insurance described in this Document 00 73 15 Insurance shall not be construed to be a limitation of the liability on the part of Contractor or any of its subcontractors, nor to relieve any of them of any liability or responsibility under the Contract Documents, as a matter of law or otherwise.
- B. Certificates of Insurance and Endorsements shall clearly indicate City Contract number and title of Contract Documents. Contractor shall maintain insurance in full force and effect during entire period of performance of Contract Documents. Contractor shall keep insurance in force during warranty and guarantee periods, except that Contractor may discontinue All-Risk Course of Construction Insurance after final payment. At time of making application for

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extension of time, Contractor shall submit evidence that insurance policies will be in effect during requested additional period of time.

- C. Required minimum amounts of insurance may be increased should conditions of Work, in opinion of City, warrant such increase. Contractor shall increase required insurance amounts upon direction by City.
- D. Any type of insurance or any increase of limits of liability not described in this Document 00 73 15 which Contractor requires for its own protection or on account of statute shall be its own responsibility and at its own expense.
- E. Any policies effected by Contractor on its own and/or rented equipment and material shall contain a provision requiring the insurance carriers to waive their rights of subrogation against City and all other indemnitees named in the Contract Documents, as well as insurance carriers for the Project.
- F. Should Contractor engage a subcontractor, the same conditions will apply under the Contract Documents to each subcontractor, of every tier.
- G. Contractor shall cooperate fully with City and Contractor's insurance companies in a safety and accident prevention program and claims handling procedures as established for the Project.
- H. Contractor shall report to the City, in addition to Contractor's insurer, any and all insurance claims submitted by the Contractor in connection with the Work under this Contract.
- I. City and its Directors, officers, employees, and agents are additional insureds in the policy(ies) as to the work being performed under this Agreement.
- J. The coverage is primary and non-contributory to any other insurance carried by City.

7. ENDORSEMENTS.

- A. All of the following clauses and endorsements, or similar provisions, are required to be made a part of each of the required policies.
 - 1. Additional Insureds. The City, its elected officials, officers, directors, employees, agents and authorized volunteers shall be named as Additional Insureds on Contractor's All Risk policy and on Contractor's and its subcontractors' policies of Commercial General Liability and Automobile Liability insurance using, for Contractor's policy/ies of Commercial General Liability insurance, ISO CG forms 20 10 and 20 37 (or endorsements providing the exact same coverage, including completed operations), and, for subcontractors' policies of Commercial General Liability insurance, ISO CG form 20 38 (or endorsements providing the exact same coverage). Notwithstanding the minimum limits set forth in this Contract for any type of insurance coverage, all available insurance proceeds in excess of the specified minimum limits of coverage shall be available to the parties required to be named as Additional Insureds hereunder.
 - 2. The Certificate(s) of Insurance, policies and endorsements required herein shall so covenant and shall be construed as primary, and the City's insurance and/or deductibles and/or self-insured retentions or self-insured programs shall not be construed as contributory.

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8. PROOF OF INSURANCE COVERAGE AND COVERAGE VERIFICATION.

- A. All of the insurance companies providing insurance for Contractor, except for surety bonds, shall have and provide proof of an A. M. Best Rating Service rate of A:VI or above or a company of equal financial stability that is approved by the City Attorney's Office. If umbrella or excess liability coverage is used to meet any required limit(s) specified herein, the Contractor shall provide a "follow form" endorsement satisfactory to the City indicating that such coverage is subject to the same terms and conditions as the underlying liability policy. Contractor shall not take possession, or use the Site, or commence operations under this Contract until the City has been furnished original Certificate(s) of Insurance and certified original copies of endorsements or policies of insurance including all endorsements and any and all other attachments as required in this section. The original endorsements for each policy and the Certificate of Insurance shall be signed by an individual authorized by the insurance carrier to do so on its behalf.
- B. Upon City's request, Contractor shall submit to City copies of the actual insurance policies or renewals or replacements.
- C. No cancellation or modification of the coverage provided shall be effective until written notice has been given to City at least thirty (30) days prior to the effective date of such modification or cancellation. In the event of non-renewal, written notice shall be given at least thirty (30) days prior to the effective date of non-renewal. All of the above insurance and the certificates evidencing the same shall contain the following wording verbatim:
- "City of Lafayette is interested in the maintenance of this insurance and it is agreed that this insurance will not be canceled, materially changed or not renewed without at least thirty (30) days' prior written notice sent to City."*
- D. Contractor agrees, if it does not keep all required insurance in full force and effect and furnish satisfactory evidence thereof, City shall have the right (but not the obligation) to take out and maintain same for all parties on behalf of Contractor, who agrees to furnish all necessary information thereof and to pay the cost thereof immediately upon presentation of a bill. If Contractor fails to pay any bill, the repayment thereof shall be a proper charge against Contractor or credit against any moneys or consideration to which Contractor may otherwise be entitled under the terms of the Contract Documents.

END OF DOCUMENT

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DOCUMENT 00 82 30

APPRENTICESHIP PROGRAM

1. Contractor and subcontractors shall comply with the requirements of California Labor Code Sections 1776, 1777.5 and 1777.6 concerning the employment of apprentices by Contractor or subcontractors. Willful failure to comply may result in penalties, including loss of the right to bid on or receive public works contracts.
2. Section 1777.5, as amended, requires a Contractor or subcontractor employing tradespersons in any apprentice able occupation to apply to the joint apprenticeship committee nearest the site of a public works project and which administers the apprenticeship program in that trade for a certification of approval. The certificate will also fix the ratio of apprentices to journeypersons that will be used in performance of the Contract. The ratio of work performed by apprentices to journeypersons in such cases shall not be less than one *hour* of apprentices work for every five *hours* of labor performed by journeypersons (the minimum ratio for the land surveyor classification shall not be less than one apprentice for each five journeypersons), except:
 - A. When unemployment for the previous three-month period in the area exceeds an average of 15 percent;
 - B. When the number of apprentices in training in the area exceeds a ratio of one to five;
 - C. When a trade can show that it is replacing at least 1/30 of its membership through apprenticeship training on an annual basis state-wide or locally; or
 - D. Assignment of an apprentice to any work performed under a public works contract would create a condition which would jeopardize his or her life or the life, safety, or property of fellow employees or the public at large or if the specific task to which the apprentice is to be assigned is of such a nature that training cannot be provided by a journeyperson.
3. Contractor is required to make contributions to funds established for administration of apprenticeship programs if Contractor employs registered apprentices or journeypersons in any apprentice able trade on such contracts and if other contractors on the public works site are making such contributions.
4. Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of the California Department of Industrial Relations, or from the Division of Apprenticeship Standards and its branch offices.

END OF DOCUMENT

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DOCUMENT 00 91 13

ADDENDA

[DOCUMENT TO BE COMPLETED AS ADDENDA DURING BID PERIOD]

END OF DOCUMENT

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes summary of work including:
 - 1. Work Covered by the Contract Documents.
 - 2. Bid Items.
 - 3. Work Sequence.
 - 4. Notification.
 - 5. Contractor Use of Premises.
 - 6. Punch List Verification.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. In general, the scope of Work for the Lafayette Community Center Restrooms Renovation Project ("Project") consists of, but is not limited to the following: targeted demolition, concrete refinishing/reinforcement, rough and finish carpentry, plumbing, gypsum board installation, insulation, tiling, installation of door hardware, restroom fixtures, lighting, electrical, HVAC mechanical work and ducting and other related items needed to support the renovation of a commercial restroom.
- B. Contractor's use of the premises for Work and storage is limited to the Project site.

1.03 BID ITEMS

- A. Any bid item may be deleted in total or in part prior to or after Award of Contract without compensation in any form or adjustment of other bid items or prices therefor. Should such deletion occur, it will not impact the basis of award, as publicly announced immediately prior to bid opening.

1.04 WORK SEQUENCE

- A. Contractor shall sequence work in such a manner so as to expedite Project completion in the shortest time frame and to avoid irreparable impacts and damage to existing and newly constructed facilities and adjacent properties.

1.05 NOTIFICATION

- A. Contractor shall comply with the notification procedures specified in Sections 6-10 of the General Provisions of the Standard Specifications, unless otherwise expressly modified by these Project Specifications.
- B. Compensation to comply with these provisions shall be considered included in the contract price paid and no additional compensation shall be allowed therefore.

1.06 CONTRACTOR USE OF PREMISES

- A. Prior to commencement of Work, Contractor and Engineer shall jointly survey relevant properties and areas adjacent to the Project Site, making notes and records of existing visible conditions. This record shall serve as the basis for determination of subsequent

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damage to the premises that may be caused by Contractor's operations. All parties making the survey shall sign the official record of existing conditions. Damage of any nature to the area not noted in the original survey but subsequently noted shall be reported immediately to City.

- B. Contractor's attention is directed to conditions for Contractor's access and use of the Project site as stipulated in the General Conditions (Document 00 72 00).

1.07 PUNCH LIST VERIFICATION

- A. Inspection of punch list Work shall be performed according to Section 01 77 00 of these Specifications. One follow-up review of punch list items for each discipline will be provided. If further site visits are required to review punch list items due to incompleteness of the Work by Contractor, Contractor shall reimburse the City for all costs arising from the additional site visits to review punch list items. Said payment shall be deducted from any money due to Contractor as part of the Contract.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF DOCUMENT

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SECTION 01 22 10

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section describes requirements and procedures for determining amount of Work done and for obtaining payment for Work done.

1.02 REFERENCES: California Public Contract Code

1.03 NOT USED

1.04 DETERMINATION OF QUANTITIES

- A. Quantity of Work to be paid for under any item for which a unit price is fixed in Contract Documents shall be the number, as determined by City, of units of Work satisfactorily completed in accordance with Contract Documents or as directed by City. Escrow Bid Documents or the Schedule of Values may be used as a guide in determining the unit price. Unless otherwise provided, determination of number of units of Work so completed will be based, so far as practicable, on actual measurement or count within prescribed or ordered limits, and no payment will be made for work done outside of limits. Measurements and computations will be made by methods as City may consider appropriate for class of Work measured. Contractor shall immediately inform City of any disputes regarding quantity measurements and shall immediately supply City with any documentation supporting the disputed measurements.

1.05 SCOPE OF PAYMENT

- A. Payment to Contractor at the unit prices or other price fixed in the contract shall be considered full compensation for completing all Work in accordance with Contract Documents, and for all expenses incurred by Contractor for any purpose in connection with the performance and completion of said Work, including all incidental Work necessary for completion of the Work, whether or not expressly specified or shown.
- B. Unless Contract Documents expressly provide otherwise, the Contract payment shall be deemed to include:
 - 1. Any and all costs arising from any unforeseen difficulties which may be encountered during, and all risks of any description connected with the prosecution of Work, bid item or unit price item, respectively, until acceptance by City;
 - 2. All expenses incurred due to suspension, or discontinuance of Work, bid item or unit price item, respectively, as provided in Contract Documents;
 - 3. Escalation to allow for cost increases between time of Contract Award and completion of Work, bid item or unit price item, respectively.
- C. Whenever it is specified herein that Contractor is to do Work or furnish materials of any class for which no price is fixed in Contract Documents, it shall be understood that Contractor is to do such Work or furnish such materials without extra charge or allowance or direct payment of any sort, and that cost of doing Work or furnishing materials is to be included in price bid, unless it is expressly specified herein, in particular cases, that Work or material is to be paid for as extra Work.

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- D. At the sole discretion of the City, City may make payments for materials or equipment not yet incorporated into the Work at the request of Contractor. Where Contractor requests payment for materials and equipment not incorporated in the Work, Contractor must satisfy the following conditions:
1. The materials and/or equipment shall be delivered and suitably stored at the site, when practical, or at another local location agreed to in writing, for example, a mutually acceptable warehouse;
 2. Full title to the materials and/or equipment shall vest in City at the time of delivery to the site, warehouse or other storage location;
 3. Contractor shall obtain a negotiable warehouse receipt, endorsed over to City for materials and/or equipment stored in an off-site warehouse. No payment shall be made until such endorsed receipts are delivered to City;
 4. Stockpiled materials and/or equipment shall be available for City inspection, but City shall have no obligation to inspect them and its inspection or failure to inspect shall not relieve Contractor of any obligations under the Contract Documents. Materials and/or equipment shall be segregated and labeled or tagged to specifically identify these specific Contract Documents;
 5. After delivery of materials and/or equipment, if any inherent or acquired defects are discovered, defective materials and/or equipment shall be removed and replaced with suitable materials and/or equipment at Contractor's expense;
 6. At its expense, Contractor shall insure the materials and/or equipment against theft, fire, vandalism, and malicious mischief, as well as any other coverages required under the Contract Documents;
 7. Contractor's application for payment shall be accompanied by an invoice and delivery tag, or other similar documentation warranting that City has received the materials and equipment free and clear of all liens and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect City's interest therein, all of which must be satisfactory to City. This documentation shall include, but not be limited to, conditional releases of mechanics' liens and stop payment notices from all those providing materials and equipment as to which the application for payment relates, as well as unconditional releases of the same from the same as to the previous application for payment for which they have not already been provided.

1.06 BASIS OF PAYMENT

- A. For specific portion of Work to be paid, payment will be based on the approved Schedule of Values of such portion of Work, or in the event a Schedule of Values is not required, on the percentage of the lump sum scope satisfactorily completed.
- B. City does not expressly, or by implication, agree, warrant, or represent in any manner, that actual amount of Work will correspond with amount shown or estimated and reserves right to increase or decrease amount of any class or portion of Work, to leave out entire Bid Item or Items, or to add work not included in Bid, when in its judgment such change is in best interest of City. No change in Work shall be considered waiver of any other condition of Contract Documents. No claim shall be made for anticipated profit, for loss of profit, for damages, or for extra payment whatsoever, except as otherwise expressly provided for in Contract Documents, because of any differences between amount of work actually done and estimated amount as set forth herein, or for elimination of extra Bid Items.

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1.07 PROGRESS PAYMENTS

- A. If requested by Contractor, progress payments will be made monthly, but not more often than monthly.
- B. Schedule of Values
1. Within ten (10) calendar days from issuance of Notice of Award and prior to the Contractor's application for the first progress payment, Contractor shall submit a Schedule of Values, which is a detailed breakdown of its bid for Work items and/or activities, including coordination responsibilities and project record document responsibilities. Where more than one subcontractor comprises the Work of a Work item or activity, the Schedule of Values shall show a separate line item for each subcontract. Contractor shall furnish such breakdown by assigning dollar values (cost estimates) to each applicable Progress Schedule network activity, whose cumulative sum equals the total Contract Sum. The value for each activity shall be segregated by materials, equipment, labor, mark-up, and other associated costs. Other format and detail of the breakdown shall be as directed by City to facilitate and clarify future progress payments to Contractor for Work under Contract Documents. Work with lump sum values shall not exceed \$10,000 per Work item. Work values totaling more than \$10,000 per item shall be broken down on a unit basis (e.g., linear foot, square yard, cubic yard, each unit installed, etc.).
 2. Contractor's overhead, profit, insurance, cost of bonds and/or other financing, as well as "general conditions costs", (e.g., site cleanup and maintenance, temporary roads and access, off site access roads, temporary power and lighting, security and the like), shall be prorated through all activities so that the sum of all the Schedule of Values line items equals Contractor's total Contract Sum.
 3. City will review the breakdown in conjunction with the approved progress schedule activities to ensure that the dollar amounts of the Schedule of Values are, in fact, fair market cost allocations for the Work items listed. Upon favorable review by City, City will accept this Schedule of Values for use. City shall be the sole judges of fair market cost allocations.
 4. Any attempt to unbalance the distribution of overhead, profit, and other fixed costs, or to manipulate the cost breakdown in any way, or to increase the cost of early activities, i.e. "front loading", will be rejected by City, resulting in a complete reallocation of monies until such distortion is corrected. Repeated attempts of manipulation may result in suspension or termination of the Work or refusal to process progress payments, until such time as the Schedule of Values is acceptable to City.
- C. Payment Requests
1. On or before the last day of each month Contractor shall submit for City review two (2) copies of a request for payment. Contractor shall certify in writing that such request for progress payments is accurate for work put in place up until midnight of the last day of that one month period, less the aggregate of previous payments.
 2. Contractor's attention is directed to Section 01 32 10, Paragraph 1.06.C regarding the submittal of updated Baseline CPM Schedules as a condition of progress payments being made. Contractor shall not be entitled to progress payments without compliance with said provisions.
 3. Each payment request shall list each Change Order and Field Directive (See Section 01 25 10) executed prior to date of submission, including a description of the Work activities.
 4. Monthly progress payments shall be made, based on total value of activities completed or partially completed, as determined by City with participation of Contractor, and based upon approved activity costs. Accumulated retainage will be shown as a

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separate item in payment summary. If Contractor fails or refuses to participate in construction progress evaluation with City, Contractor shall not receive current payment until Contractor has participated fully in providing construction progress information and schedule update information to City.

5. If required by City, Contractor shall submit substantiating data as they relate to payment requests.

D. Progress Payments

1. If it is determined that the payment request is not a proper payment request suitable for payment, City shall return it to the Contractor as soon as practicable, but no later than seven (7) days after receipt, together with a document setting forth in writing the reasons why the payment request is not proper. If City determines that portions of the payment request is not proper or not due under the Contract Documents, then City may approve the other portions of the payment request, and in the case of disputed items or defective Work not remedied, may withhold up to 150% of the disputed amount from the progress payment.
2. As soon as practicable after approval of each request for progress payment, City will pay to Contractor in manner provided by law, an amount equal to ninety-five percent (95%) of City's estimate, or a lesser amount if so provided in Contract Documents, provided that payments may at any time be withheld if, in judgment of City, Work is not proceeding in accordance with Contract, or Contractor is not complying with requirements of Contract, or to comply with stop payment notices or to offset liquidated damages accruing or expected.
3. Before any progress payment or final payment is made, Contractor may be required to submit satisfactory evidence that Contractor is not delinquent in payments to employees, subcontractors, suppliers, or creditors for labor and materials incorporated into Work. To this end, prior to final payment by City, Contractor shall submit a final waiver of lien for Contractor's Work, together with releases of lien from any subcontractor or materialmen.
4. City reserves and shall have the right to withhold payment for any equipment and/or specifically fabricated materials that, in the sole judgment of City, is not adequately and properly protected against weather and/or damage, prior to or following incorporation into the Work.
5. Granting of progress payment or payments by City, or receipt thereof by Contractor, shall not be understood as constituting in any sense acceptance of Work or of any portion thereof, and shall in no way lessen liability of Contractor to replace unsatisfactory work or material, though unsatisfactory character of Work or material may have been apparent or detected at time payment was made.
6. When City shall charge sum of money against Contractor under any provision of Contract Documents, amount of charge shall be deducted and retained by City from amount of next succeeding progress payment or from any other payment due or that may become due Contractor under Contract. If, on completion or termination of Contract, such payments due Contractor are found insufficient to cover City's charges against it, City shall have right to recover balance from Contractor or Sureties.

1.08 SUBSTITUTION OF SECURITIES IN LIEU OF RETENTION

- A. City will permit substitute securities for retention monies withheld to ensure performance of Contract, as set forth in Document 00 68 00, "Escrow Agreement for Security Deposits in Lieu of Retention", in accordance with California Public Contract Code, Section 22300. By this reference, Document 00 68 00, "Escrow Agreement for Security Deposits in Lieu of Retention" is incorporated in full in these Specifications.

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1.09 FINAL PAYMENT

- A. As soon as practicable after all required Work is completed in accordance with Contract Documents, excluding Contractor maintenance after Final Acceptance, City will pay to Contractor, in manner provided by law, unpaid balance of contract price of Work, payment for maintenance after acceptance, and sums as may be lawfully retained under any provisions of Contract Documents or by law. Unless otherwise required by law, the final payment of retention, if unencumbered, shall be paid no later than sixty (60) days after the date of recordation of the Notice of Completion. Acceptance by Contractor of the final payment shall constitute a waiver of all claims against City arising from this Contract. Payments to Contractor shall not be construed to be an acceptance of any defective work or improper materials, or to relieve Contractor of its obligations under the Contract Documents.
- B. Prior progress payments shall be subject to correction in the final payment. City's determination of amount due as final payment shall be final and conclusive evidence of amount of Work performed by Contractor under Contract Documents and shall be full measure of compensation to be received by Contractor.
- C. Contractor and each assignee under an assignment in effect at time of final payment shall execute and deliver at time of final payment and as a condition precedent to final payment, Document 00 65 10, "Agreement and Release of Any and All Claims", discharging City, its officers, agents, employees and consultants of and from liabilities, obligations, and claims arising under Contract Documents.

1.10 EFFECT OF PAYMENT

- A. Payment will be made by City, based on City's observations at the site and the data comprising the Application for Payment. Payment will not be a representation that City has:
 - 1. Made exhaustive or continuous on-site inspections to check the quality or quantity of Work;
 - 2. Reviewed construction means, methods, techniques, sequences or procedures;
 - 3. Reviewed copies of requisitions received from subcontractors and material suppliers and other data requested by City to substantiate Contractor's right to payment; or
 - 4. Made examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Sum.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

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SECTION 01 25 10

MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section describes general procedural requirements for alterations, modifications and extra Work.
- B. Related Sections
 - 1. Section 01 11 00: Summary of Work
 - 2. Section 01 22 10: Measurement and Payment

1.02 GENERAL

- A. Any change in scope of work or deviation from Contract Documents, including without limitation extra work, or alterations or additions to or deductions from the original Work, shall not invalidate the original Contract, and shall be performed under the terms of the Contract Documents.
- B. Only Contractor or City may initiate changes in scope of Work, or deviation from Contract Documents.
 - 1. Contractor may initiate changes by submitting Requests for Information (RFI)
 - 2. Contractor shall be responsible for its costs to implement and administer RFIs throughout the Contract duration. Regardless of the number of RFIs submitted, Contractor will not be entitled to additional compensation. Contractor shall be responsible for City's administrative and consultant costs for answering its RFIs where the answer could reasonably be found by reviewing the Contract Documents, or frivolous RFIs, as determined by City (Also see Document 00 72 00, Part 15.D.d). Such costs will be deducted from progress payments.
 - 3. City may initiate changes in the Work or Contract Times by issuing Requests for Proposal (RFP) to Contractor. Such RFPs will detail all proposed changes in the Work and request a quotation of changes in Contract Sum and Contract Times from Contractor.
 - 4. City may also, by Field Directive, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly. A Field Directive may be used to solicit a Cost Proposal from Contractor for the desired change. A Field Directive shall also be used in the absence of total agreement on the terms of a Change Order.

1.03 PROCEDURE

- A. RFI and Cost Proposal Review - Procedure. Contractor shall submit RFI to the Engineer. When Contractor receives requests for information from a subcontractor, Contractor shall provide a copy to the Engineer, but shall not submit it to the Engineer for response unless and until Contractor (i) has reviewed the RFI, (ii) determined that neither Subcontractor nor Contractor have sufficient information to resolve the issue raised therein, and (iii) Contractor affirms same to the Engineer. Contractor shall reference each RFI to an activity of Progress Schedule and allow and indicate a reasonable time within which a response is

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required. Contractor's failure to reference RFI to an activity on the Progress Schedule and note time for response on the RFI shall constitute Contractor's waiver of any claim for time delay or interruption to the Work resulting from asserted delay in responding to the RFI. Contractor shall distribute response to all appropriate subcontractors.

1. If Contractor is satisfied with the response and does not request change in Contract Sum or Contract Times, then the response shall be executed without a change.
 2. If Contractor believes the response is incomplete, Contractor shall issue another RFI (with a notation indicating it to be a follow-up RFI) to City clarifying original RFI. City may return RFI requesting additional information should original RFI be inadequate in describing the condition in question.
 3. If Contractor believes that the response results in change in Contract Sum or Contract Times, Contractor shall notify City in writing and submit a Cost Proposal for review within seven (7) calendar days after receiving the response. If City disagrees with Contractor, then Contractor may proceed under Part 12 of Document 00 72 00 General Conditions. Contractor's failure to deliver the foregoing notice and Cost Proposal by the deadline stated above shall result in waiver of the right to file a Cost Proposal. City will respond to the Cost Proposal within seven (7) calendar days of receipt.
 4. If City accepts the Cost Proposal, City will prepare Change Order for City and Contractor signatures.
 5. If Cost Proposal is not acceptable to City, City will submit in its response what it believes to be a reasonable cost and/or adjustment, if any. Contractor shall have seven (7) calendar days in which to respond to City.
 6. If time does not permit this response period, City will issue a Field Directive with its recommended cost and/or time adjustment. Upon receipt of Field Directive, Contractor shall proceed with work and concurrently respond to City's response within the time period reference above. Contractor's response may be any one of following:
 - a. Return Field Directive signed, thereby accepting City's response.
 - b. Submit a revised Cost Proposal with supporting documentation.
 - c. Submit a Claim as described in Part 12, Document 00 72 00 General Conditions.
 7. Contractor shall submit RFI as a first step to resolve differing site conditions or hazardous waste materials encountered in the Work.
- B. City Requested Proposals - Procedure. City may request a Cost Proposal from Contractor by issuing a Field Directive. Contractor shall respond to City's request within seven (7) calendar days by furnishing a Cost Proposal containing a complete breakdown of costs of credits, deducts and extras; itemizing materials, equipment, labor, taxes, overhead and profit. Subcontract work shall be so indicated. City may review Cost Proposal as set forth above. Upon approval of proposal, City will issue a Change Order directing Contractor to proceed with extra work. If the parties do not agree on the price, City may either re-issue the Field Directive directing the work be performed, or decide the issue per Part 12 of Document 00 72 00 General Conditions. Contractor shall perform the changed work notwithstanding any claims or disagreements of any nature.
- C. Field Directive - Procedure. Upon receipt of a Field Directive, Contractor shall promptly proceed with the change in the work involved and advise City of Contractor's agreement or disagreement with the method, if any, provided in the Field Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

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1. If the Field Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods unless City and Contractor mutually agree in some other manner:
 - a. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation.
 - b. Unit prices stated in the Contract Documents, Schedule of Values or subsequently agreed upon.
 - c. On a not to exceed amount, which shall be expended based on time and material records of the work prepared and submitted each day by the Contractor to the City in conformance with the Force Account procedures outlined in paragraph 1.06 of this Specification 01 25 10. These record sheets shall itemize all work performed on the Field Directive work scope. All time and material records must be signed by the City's field representative indicating their agreement that the claimed work occurred. The signature of the City's field representative on the time and material record sheets does not constitute City agreement that the listed work is a contract change or that it is eligible for extra payment.
 2. A Field Directive signed by Contractor indicates the agreement of Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.
 3. If Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by City on the basis of reasonable expenditures and savings of those performing the work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance or overhead and profit. If the parties still do not agree on the price for a Field Directive, Contractor may file a claim per Part 12, Document 00 72 00 General Conditions. Contractor shall keep and present, in such form as City may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this paragraph shall be limited to those provided in paragraphs 1.04 and 1.05 below.
 4. Pending final determination of cost to City, amounts not in dispute may be included in Applications for Payment. The amount of credit to be allowed by Contractor to City for a deletion or change, which results in a net decrease in the Contract Sum, shall be actual net cost as confirmed by City. When both additions and credits covering related work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.
- D. All Changes.
1. Contractor shall maintain detailed records of work done on a time and material basis. Contractor shall document each proposal for a change in cost or time with sufficient data to allow evaluation of the proposal. Contractor shall, on request, provide additional data to support computations for:
 - a. Quantities of products, materials, labor and equipment.
 - b. Taxes, insurance and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time and new Progress Schedule showing revision due, if any.
 - e. Credit for deletions from Contract, incorporating (a) through (c) above, similarly documented.

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2. Contractor shall support each claim for additional costs, and for work done on a cost and percentage basis, with additional information including:
 - a. Credit for deletions from Contract, similarly documented.
 - b. Origin and date of claim.
 - c. Dates and times work was performed and by whom.
 - d. Time records and wage rates paid per Contractor's certified payroll and fringe benefit statements.
 - e. Invoices and receipts for products, materials, equipment and subcontracts, similarly documented.
3. When both additions and credits are included in a change, the net change in quantity of work shall first be calculated prior to applying the unit costs of labor, materials, and equipment to the quantity.

E. Correlation of Subcontractor Submittals

1. Contractor will revise Schedule of Values and Application for Payment forms to record each authorized Change Order or Field Directive as a separate line item and adjust the Contract Sum as shown thereon prior to the next monthly pay period. Changes to the Schedule shall be highlighted for easy identification.
2. Contractor shall revise the Progress Schedule prior to the next monthly pay period if it is affected by any Change Order or Field Directive.

1.04 COST DETERMINATION

- A. Total cost of extra work or of work omitted shall be the sum of labor costs, material costs, equipment rental costs and specialist costs directly used in constructing the work plus overhead and profit as allowed herein. This limit applies in all cases of claims for extra work, whether calculating Cost Proposals, Change Orders or Field Directive, or calculating claims of all types, and applies even in the event of fault, negligence, strict liability, or tort claims of all kinds, including strict liability or negligence. Contractor may recover no other costs, including costs associated with document reproduction and transmittal, office and administrative overhead, interest, escalation, and any similar costs associated with the extension of contract time, arising out of or connected with the performance of extra work, of any nature. No special, incidental or consequential damages may be claimed or recovered against City, its representatives or agents, whether arising from breach of contract, negligence or strict liability, unless specifically authorized in the Contract Documents.
- B. Overhead and Profit:
1. The Prime Contractor shall be allowed a mark-up for overhead and profit on materials and equipment for extra work not to exceed 15 percent (15%). Prime Contractor's mark-up for overhead and profit on labor for extra work shall not exceed 20 percent (20%).
 2. When a first tier subcontractor performs extra work, Prime Contractor shall receive a 5 percent (5%) mark-up on subcontractors' total costs of extra work. First tier subcontractor's overhead and profit on its work shall not exceed 15 percent (15%) total.
 3. When extra work is performed by a second or lower tier subcontractor, Prime Contractor shall receive a maximum total mark-up of 5 percent (5%), and the first tier subcontractor shall receive a maximum total mark-up of five percent (5%) on the lower tier subcontractors' total costs of extra work, which shall include overhead and profit mark-up not exceeding 15 percent (15%).

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4. Notwithstanding the foregoing, in no case shall the total overhead and profit mark-up on any extra work exceed twenty-five percent (25%) of the direct cost, notwithstanding the actual number of contract tiers. It is Prime Contractor's sole responsibility to structure its subcontracts to conform to this provision.
5. On proposals covering both increases and decreases in Contract Sum, mark-up shall be allowed on the net increase only as determined above. When the net difference is a decrease, no percentage mark-up shall be allowed.
6. Overhead and profit shall be considered to include compensation for all indirect costs, including costs due to any cumulative delay, inefficiencies, or any other cumulative impacts or disruptions on Contractor's resources and planned progression resulting from the extra work. Contractor's mark-up shall be construed to include engineering; supervision; warranties; and cost of preparing the cost proposal; and all jobsite and home office overhead, including small tools and equipment; and profit. No mark-up shall be allowed on taxes, insurance, and bonds.

C. Owner Operated Equipment

1. Payment for equipment shall be in accordance with 1.05.C below.
2. Payment for labor shall be at no more than the rates established by prevailing wages for the type of worker and location of work.

1.05 COST BREAKDOWN

A. Labor - City will pay cost of labor for workers (including forepersons when authorized) used in actual and direct performance of extra work, excluding any hours involved with commuting, travel, or "minimum rates," whether employer is Contractor, subcontractor or other forces. Cost will be the sum of following:

1. Actual Wages - Actual wages paid shall include any employer payments to or on behalf of workers for health and welfare, pension, vacation and similar purposes.
2. Labor surcharge - Payments imposed by local, county, state and federal laws and ordinances, and other payments made to, or on behalf of, workers, other than actual wages as defined in subparagraph 1 above, such as taxes and insurance. Labor surcharge shall be 20% and in accordance with Section 9-3.4.2 of the General Provisions of the Standard Specifications.

B. Material - Only materials furnished by Contractor and necessarily used in performance of extra work will be paid for. Cost of such materials will be cost, including sales tax, to purchaser (Contractor, subcontractor or other forces) from supplier thereof, except as the following are applicable:

1. If cash or trade discount by actual supplier is offered or available to purchaser, it shall be credited to City notwithstanding fact that such discount may not have been taken.
2. For materials salvaged upon completion of extra work, salvage value of materials shall be deducted from cost, less discounts, of materials.
3. If cost of a material is, in opinion of City, excessive, then cost of material shall be deemed to be lowest current wholesale price at which material is available in quantities concerned delivered to Site, less any discounts as provided in subparagraph 1 above.

C. Equipment Rental

1. Section 9-3.4.4 of the General Provisions of the Standard Specifications shall apply.

D. Work Performed by Special Forces or Other Special Services

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1. When City and Contractor, by agreement, determine that a special service or item of extra work cannot be performed by forces of Contractor or those of any first tier or lower subcontractors, the service or extra work item may be performed by a specialist. Invoices for service or item of extra work on basis of current market price thereof may be accepted without complete itemization of labor, material, and equipment rental costs when it is impracticable and not in accordance with established practice of special service industry to provide complete itemization. In those instances wherein Contractor is required to perform extra work necessitating a fabrication or machining process in a fabrication or machine shop facility away from Site, charges for that portion of extra work performed in such facility may, by agreement, be accepted as a specialist billing. City must be notified in advance of all off-site work. In lieu of overhead and profit provided in Paragraph 1.04.B of this Section 01 25 10, a 15 percent (15%) mark-up will be allowed on the specialist invoice price, less credit to City for any cash or trade discount offered or available, whether or not such discount may have been taken.

1.06 FORCE-ACCOUNT

- A. If it is impracticable because of nature of work, or for any other reason, to fix an increase or decrease in price definitely in advance, the Contractor may be directed to proceed at a not-to-exceed (NTE) maximum price which shall not under any circumstances be exceeded. Subject to such limitation, such extra work shall be paid for at actual necessary cost for Force-Account Work or at the negotiated cost, as determined by City. The cost for Force-Account Work shall be determined pursuant to paragraphs 1.04 and 1.05 of this Section 01 25 10.
- B. Whenever any Force-Account Work is in progress, definite price for which has not been agreed on in advance, Contractor shall report to City each day in writing in detail amount and cost of labor and material used, and any other expense incurred in Force-Account Work on preceding work day as required herein. No claim for compensation for Force-Account Work will be allowed unless reports have been made.
- C. Force-Account Work shall be paid as extra work under this Section. Above described methods of determining payment for work and materials shall not apply to performance of work or furnishings of material, which, in judgment of City, may properly be classified under items for which prices are established in Contract Documents.

1.07 CITY FURNISHED MATERIALS

- A. City reserves right to furnish materials, as it deems advisable, and Contractor shall have no claims for costs and overhead and profit on such materials.

1.08 OVERHEAD DEFINED

- A. The following constitutes charges that are deemed included in the overhead of Prime Contractor and all subcontractors for all contract modifications, including Force-Account Work, and work required by Field Directive, whether incurred by Contractor, subcontractors, or suppliers:
 1. Drawings: field drawings, sketches, etc. including submissions of drawings
 2. Contractor supervision and/or routine field inspection of work proposed
 3. General superintendence and project management

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4. General administration and preparation of cost proposals, schedule analysis, change orders and other supporting documentation as necessary, including all reproduction and transmittal costs
5. Computer services
6. Reproduction and transmittal services of any kind
7. Salaries of project engineer, project manager, superintendent, timekeeper, storekeeper and administrative assistants, secretaries
8. Janitorial services
9. Temporary on-site facilities
10. Offices and telephones
11. Plumbing, electrical, power, lighting
12. Platforms
13. Fencing and protection of work
14. Procurement and use of vehicles and fuel used coincidentally in base bid work.
15. Estimating
16. Subcontractor bonds and insurance premiums and costs
17. Transportation, parking, handling and disposal fees
18. Consumables and attrition
19. Final cleanup and other incidental work
20. Home Office Expenses
21. Surveying
22. Record Drawings (As Built)

1.09 RECORDS AND CERTIFICATION

- A. Force-Account (cost reimbursement) charges shall be recorded daily upon Cost Breakdown for Contract Modification Form. Contractor or authorized representative shall complete and sign form. Contract Modification Form shall provide names and classifications of workers and hours worked by each, itemize materials used, and also list size type and identification number of equipment, and hours operated, and shall indicate work done by specialists.
- B. No payment for Force-Account Work shall be made until Contractor submits original invoices substantiating materials and specialists charges. No payment for Field Directive Work shall be made until negotiations have been completed and the subsequent Change Order issued.
- C. City shall have the right to audit all records in possession of Contractor or first tier subcontractors or lower tier subcontractors relating to activities covered by Contractor's claims for modification of Contract, including Force-Account Work and Field Directive Work, as set forth in Document 00 72 00 General Conditions.
- D. Further, City shall have right to audit, inspect, or copy all records maintained in connection with this Contract, including financial records, in possession of Contractor relating to any transaction or activity occurring or arising out of, or by virtue of, the Contract.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

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COST PROPOSAL FORM

Date: _____

Project Number _____

In Response To _____ (RFP #, etc.)

To: City of Lafayette
3675 Mt. Diablo Boulevard, Suite 210
Lafayette, CA 94549

Brief description of change(s): _____

ITEM DESCRIPTION	PRIME CONTR.	SUB 1	SUB 2	SUB 3	SUB 4	TOTAL
Material						
Direct Labor Cost						
Equipment						
Other (Specify)						
Total Cost						
Contractor's Overhead and Profit (20% max, L)						
Subcontractor's Overhead and Profit (15% max M&L)						
Contractor's Overhead and Profit (15% max M)						
Mark-Up for Subcontractor's work (5% max)						
GC Bond & Insurance						
GRAND TOTAL						
REQUESTED CHANGE IN CONTRACT TIME (DAYS)						

M: Material
L: Labor

By: _____ (Firm Name)

Signature: _____ Date: _____

Title: _____

END OF SECTION

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SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section describes the required Project meetings for this Work. These meetings include:
 - 1. Preconstruction Conference.
 - 2. Weekly Progress Meetings, or as needed.

1.02 PRECONSTRUCTION CONFERENCE

- A. City will call for and administer Preconstruction Conference at time and place to be announced. Conference will occur ten (10) days after award of Contract by the City Council.
- B. Contractor, including his/her Project Manager, Superintendent, all major subcontractors shall attend Preconstruction Conference.
- C. Agenda will include, but not be limited to, the following items:
 - 1. Schedule, including submittals of shop drawings and samples
 - 2. Progress Payment protocols, including Schedule of Values
 - 3. Use of premises
 - 4. Location of the Contractor's on-site facilities
 - 5. Job site security and Housekeeping
 - 7. Submittals and Requests for Information procedures
- D. If necessary, additional meetings shall be held in follow-up to the above.

1.03 WEEKLY PROGRESS MEETINGS

- A. City will schedule and administer Progress Meetings throughout duration of the Work, if deemed necessary and appropriate. At the Engineer's discretion, in-lieu of Progress Meetings, informal meetings with the Contractor may be held to discuss the pertinent issues at the time. Meetings shall be held at the site unless otherwise directed by City.
- B. Meetings may include discussion of: Percent complete of each activity; time impact evaluations for Change Orders and Time Extension Requests; actual and anticipated activity sequence changes; actual and anticipated duration changes; actual and anticipated contractor delays; and progress payment applications.
- C. Meetings shall be attended by Contractor's Superintendent. The Engineer shall have discretion to include major subcontractors and suppliers, and other personnel as appropriate to agenda topics for each meeting.

1.04 PRE-INSTALLATION CONFERENCES

- A. Installation of certain critical components and systems require special coordination with various trades, or confirmation of expected product and results regarding appearance, function, and integration into the overall building. At the request of the Engineer, Contractor and subcontractors as designated by the Engineer shall attend pre-installation conferences for the above purpose.

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- B. Installation of conduit runs at open ceilings, and in other areas where the conduits are readily visible, shall require pre-installation meetings to confirm the precise alignment and method of conduit installation.

END OF SECTION

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SECTION 01 32 10

PROGRESS SCHEDULES AND REPORTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section describes scheduling requirements for this contract, including:
 - 1. Description, Definitions and General Schedule Requirements
 - 2. CPM Schedule
 - 3. Schedule Updates
 - 4. Recovery Schedules
 - 5. Schedule Delay and Time Impact Evaluations

- B. Related Sections
 - 1. Section 01 11 00: Summary of Work
 - 2. Section 01 22 10: Measurement and Payment
 - 3. Section 01 31 19: Project Meetings
 - 4. Section 01 33 10: Submittals

1.02 GENERAL SCHEDULE REQUIREMENTS

- A. Contractor shall develop a schedule for the project demonstrating complete fulfillment of all contract requirements, shall keep the schedule up to date in accordance with the requirements of this section and shall utilize the Critical Path Method (CPM) in planning, coordinating, performing and reporting the work under this contract, including all activities of subcontractors, equipment vendors, and suppliers, and in assisting the City in monitoring the progress of the Work.

1.03 DESCRIPTIONS AND DEFINITIONS

- A. Critical work activities are defined as work activities, which, if delayed or extended, will delay the scheduled completion of the Work. All other work activities are defined as non-critical work activities and are considered to have float.

- B. Float is defined as the time that a non-critical work activity can be delayed or extended without delaying the scheduled completion of milestones specified in this Section or the scheduled completion of the Work, or both. Float or slack time is not for the exclusive use or benefit of either the City or Contractor. Neither Contractor nor City shall have an exclusive right to the use of float. Neither City nor Contractor owns float. As such, liability for delay of final completion rests with the party whose unexcused delay, most recent in time, actually caused the completion delay.
 - 1. For example, if Party A incurs delay and uses some but not all of the float, and Party B later incurs unexcused delay and uses the remainder of the float as well as additional time beyond the float, Party B shall be liable for the time that represents a delay to the final completion. Party A would not be liable because it did not consume the entire float and additional float remained at the time. The project completion was unaffected by Party A.
 - 2. Delays to any non-critical activities shall not be the basis for an extension of contract time until the delays consume the total float associated with non-critical activities and cause the activities to become critical. Negative float is not allowed in either the Preliminary CPM Schedule or the Baseline CPM Schedule.

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3. Contractor shall not sequester float through strategies such as extending activity duration estimates to consume available float, using preferential logic, or any other techniques to manipulate float or schedule.
 4. It is acknowledged that City caused time savings (i.e., savings in critical path submittal reviews, approval of substitution requests which result in time savings for Contractor, etc.) create shared float. Accordingly, City caused time savings may offset City caused delays.
- C. Non-Working Days: All schedules shall not allow work on Saturdays, Sundays and City-observed holidays. Contractor shall ascertain information regarding City observed holidays prior to bidding.
- D. City reserves the right to require Contractor to adjust, add to, or clarify any portion of any schedule which may later be discovered to be insufficient for monitoring of Work or approval of payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.
- E. (Not Used)
- F. Failure by Contractor to include any element of the work required for the performance of this Contract and completion of the Work shall not excuse Contractor from completing all work required within the time for completion, notwithstanding City's acceptance of any schedule required by this section.
- G. Contractor shall allow seven (7) working days for City to prepare the project final punch list. Also, Contractor shall allow five (5) working days to complete all project punch list items.
- H. Submittal of the Preliminary CPM Schedule, Baseline CPM Schedule, and subsequent weekly updates of the Baseline CPM Schedule, shall be understood to be the Contractor's representation that these schedules meet requirements of the Contract Documents and that Work shall be executed in sequence indicated on these schedules. Submittal shall not relieve the Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including addressing adverse effects such as delays resulting from ill-timed work

1.04 PRELIMINARY CPM SCHEDULE

- A. Submittal: Contractor shall submit a Preliminary CPM Schedule (100 or less activities) at the pre-construction meeting scheduled by the City. The Preliminary CPM Schedule should focus on the activities that are planned for the first two weeks of the project from the Notice to Proceed date and summarize the activities thereafter through the contract Final Completion date.
- B. Electronic File, Diagrams and Reports: At the preconstruction meeting, Contractor shall submit a schedule that includes and shows the following minimum information: Activity Identification, Activity Description, Work Day Duration, and Start dates.
- C. Other Schedule Content: The schedule shall also include the following milestones and related activities: Notice to Proceed, substantial completion, final completion, submittal activities for the first two weeks, architectural/engineering review activities, procurement/fabrication activities.
- D. City Review & Contractor Re-Submittal: The City will review the schedule submittal and

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provide comments to the Contractor within 7 working days from receipt of the schedule. Any revisions deemed necessary by the City, as a result of its review, shall be incorporated into the Contractor's Preliminary CPM Schedule and re-submitted to City for review within seven (7) calendar days from receipt of the City's comments.

- E. City Acceptance: City's acceptance of the Contractor's Preliminary CPM Schedule will be a condition precedent to making any progress payment for work performed by the Contractor and its subcontractors. Once accepted by the City, the schedule shall constitute the Baseline CPM Schedule.

1.05 SCHEDULE UPDATES OF THE BASELINE CPM SCHEDULE

- A. Submittal: Contractor shall update the Baseline CPM Schedule twice a month and submit each update at the Weekly Progress Meeting following the update.
- B. City Review & Contractor Re-Submittal: The City shall review and provide comments to the Contractor if it finds deviations have been made to the schedule update that are not acceptable. Contractor shall revise the schedule accordingly and resubmit for approval prior to the next weekly meeting or within 5 calendar days, whichever is shorter.
- C. Schedule updates shall be the basis for evaluating job progress, payment requests, and time extension requests. The Contractor is responsible for preparing schedule updates and monitoring actual progress as compared to the previous schedule update.
- D. Each schedule update shall continue to show all work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.
- E. Contractor shall not make unilateral revisions to activity durations or logic of work activities that were previously accepted by the City. Any changes to work activity durations or logic shall be approved by the City.
- F. Contractor acknowledges that failure by Contractor to maintain and update the schedule conforming to these provisions shall serve as prima-facie evidence of its failure to provide adequate notice conforming to Contract regarding any time delay, and as such shall be considered sufficient grounds for City to reject any claims of said delay by Contractor.

1.06 SCHEDULE DELAY, TIME IMPACT EVALUATIONS AND TIME EXTENSIONS

- A. Schedule Delay Meetings: At any time, if the updated schedule shows the project behind schedule by seven (7) days or more beyond the final completion, and the Contractor is of the opinion that the delay(s) were beyond his control, the Contractor must notify the City and follow the procedures below:
 - 1. The Contractor shall review each of the weekly schedule updates in the previous month to identify the critical path shown in each schedule update and retrospectively quantify the as-built causes of schedule slippage to the critical path in that month. The Contractor must take into account Contractor delays (e.g., lack of labor resources, late delivery of materials or equipment, not achieving anticipated labor productivity, etc.) in addition to delays beyond his control (e.g., City Change Orders, strikes and weather delays, etc.). Contractor shall present its retrospective schedule analysis at the next scheduled weekly progress meeting and either request a time extension or review the steps the Contractor will take to recapture lost time.

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2. City will respond in writing to a request within seven (7) working days and adjust the Contract Time, or not, in accordance with its findings. Contractor will waive its rights to any time extension if Contractor fails to submit its time extension request as described above.
3. (Not used)
4. In no event shall Contractor reduce labor resources in the field due to the fact that Contractor's schedule update shows off-site activities are anticipated to delay critical path work in the field.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

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SECTION 01 33 10

SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section describes general requirements for submittals for the Work:

1. Procedures
2. Product Data
3. Shop drawings
4. Samples
5. Coordination
6. Quality Control Submittals
 - a. Test Reports or Certificates
 - b. Manufacturers' Instructions
 - c. Material Safety Data Sheets
7. Operations and Maintenance Manuals
8. Computer Programs

B. Related Sections

1. Section 01 11 00: Summary of Work
2. Section 01 22 10: Measurement and Payment
3. Section 01 25 10: Modification Procedures
4. Section 01 32 10: Progress Schedules and Reports
5. Section 01 77 10: Contract Closeout
6. Section 01 78 39: Project Record Documents

1.02 PROCEDURES

A. Submittal time shall be incorporated into the project schedule. Contractor shall schedule submissions to provide a minimum of five (5) working days of review time for each submittal so as to cause no delay and to allow adequate time for review and to avoid impact to the project schedule.

B. Where manufacturer's standard drawings or data sheets are used, they shall be marked clearly to show those portions of the data that are applicable to this project. Submittals shall be submitted based on each technical specification section of the Project Manual and include all information requested thereby. Partial or incomplete submittals will be returned without review. Submittals shall include a log number and reference to Specifications Section and/or Plan sheets and details in the format required by the City.

C. The data shown on the Shop Drawings shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to show the materials and equipment Contractor proposes to provide and to enable City review of the information for the limited purposes specified below. Samples shall be identified clearly as to material, supplier, pertinent data such as catalog numbers and the use for which it is intended and otherwise as may be required to enable review of the submittal. Three units of each sample shall be submitted unless otherwise specified in the Specifications.

D. At the time of each submission, Contractor shall give City specific written notice of all variations, if any; that the Shop Drawing or Sample submitted may have from the

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requirements of the Contract Documents, and the reasons therefore. In addition, Contractor shall indicate a specific notation on each Shop Drawing and Sample submitted for review of each such variation. If City accepts deviation, City shall note its acceptance on the returned submittal form and, if necessary, issue appropriate Contract Modification.

- E. Submittal coordination and verification is responsibility of Contractor; this responsibility shall not be delegated in whole or in part to subcontractors or suppliers. Before submitting each Shop Drawing or Sample, Contractor shall have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents, and shall have determined and verified:
 - 1. All field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto;
 - 2. All materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work; and
 - 3. All information relative to Contractor's responsibilities and of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

- F. Contractor's submission to City of a Shop Drawing or Sample submittal will constitute Contractor's representation that it has satisfied its obligations under the Contract Documents, and as set forth immediately above, with respect to Contractor's review and approval of that submittal.

- G. Designation of work "by others", if shown in submittals, shall mean that work will be responsibility of Contractor rather than subcontractor or supplier who has prepared submittals.

- H. After review by City of each of Contractor's submittals, one set of submittals will be returned to Contractor with either a favorable review or a request for resubmittal due to reasons such as errors, need for additional information, or non-conformance with the specifications. Favorable reviews may be conditional on correction of minor errors and making other miscellaneous adjustments to the submittal. After City's review of submittal, Contractor shall revise submittal as noted and resubmit if required. Contractor shall identify changes made since previous submittal(s).

- I. Contractor shall produce a complete and acceptable submittal no later than the second submission. City reserves the right to deduct monies from payments due Contractor to cover additional costs of review beyond the second submission. Illegible submittals will be rejected and returned to Contractor for resubmission.

- J. Favorable review will not constitute acceptance by City of any responsibility for the accuracy, dimensions, or coordination and completeness of the submittals, all of which shall be the sole responsibility of Contractor, including responsibility to backcheck comments, corrections, and modifications from City's review before fabrication. Contractor, subcontractors, or suppliers may prepare submittals, but Contractor shall ascertain that submittals meet requirements of Contract Documents, while conforming to structural space and access conditions at point of installation. City's review will be only to determine if the items covered by the submittals generally conform to the information given in the Contract Documents and if they are generally compatible with the design concept of the completed Project as indicated by the Contract Documents. Favorable review of submittal, method of work, or information regarding materials and equipment Contractor proposes to furnish shall not relieve Contractor of responsibility for errors therein and shall not be regarded as assumption of risks or liability

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by City, or any officer, employee, consultant or agent thereof, and Contractor shall have no claim under Contract on account of failure or partial failure or inefficiency or insufficiency of any plan or method of work or material and equipment so reviewed. Favorable review shall be considered to mean merely that City has no objection at the time to Contractor using, upon his sole and full responsibility, the plan or method of work proposed, or materials and equipment proposed.

- K. City's review does not extend to the means, methods, techniques, sequences or procedures of construction or to safety precautions or programs incident thereto. The review of separate items does not indicate review of the assembly in which the items function.
- L. It shall be Contractor's responsibility to copy, conform and distribute reviewed submittals in sufficient numbers for Contractor's files, subcontractors and vendors.
- M. Contractor shall begin no fabrication or work that requires submittals until he receives a favorable review for said work.

1.03 PRODUCT DATA

- A. For products specified only by reference standards, manufacturer, trade name, model or catalog designation, and reference standards shall be provided.
- B. Product or Catalog Data:
 - 1. Manufacturers standard drawings shall be modified to delete non-applicable data or include applicable data.
 - 2. Manufacturers catalog sheets, brochures, diagrams, schedules, charts, illustrations and other standard descriptive data shall be marked to identify pertinent materials, products, or models, and show information unique to the project, such as dimensions and clearances required; performance characteristics and capacities, wiring diagrams and controls.

1.04 SHOP DRAWINGS

- A. Mandatory shop drawing submittals: 1. See Technical Specification Sections for additional shop drawing requirements.
- B. For all Project Work, submittals shall conform to the following:
 - 1. Sheet Size: Minimum 8-1/2 inches by 11 inches, maximum 24 inches by 36 inches.
 - 2. Quantity: Three (3) copies and one (1) reproducible original.
 - 3. Each copy shall identify applicable products, models, options, and other data; including supplemental data to provide information unique to the Work.
 - 4. Manufacturers' installation instructions shall be included when required by the applicable specifications.
 - 5. Shop drawings shall be drawn to scale and completely dimensioned, giving plan view together with such sections as are necessary to clearly show construction details and methods.
- C. Contractor acknowledges his responsibility to develop and provide construction details where required to fulfill the general intent of the Project Drawings and Specifications. Contractor represents that he has the knowledge, qualification, and experience of the trades related to the Work, as prerequisites to entering this Contract, to develop and provide said construction details for City's review and approval. Said effort is considered incidental to Contractor's obligations under the Contract and shall not be construed as additional services, and no

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additional compensation is owed to Contractor therefor.

1.05 SAMPLES

- A. Submittals shall conform to the following:
1. Inclusion of a full range of standard colors, textures, and patterns for City's selection.
 2. Samples shall illustrate functional and aesthetic characteristics of product, with integral parts and attachment devices. Submittal shall coordinate different product categories for interfacing work.
 3. Quantity: Three (3) samples with identification on each sample, giving full information.
 4. Unless otherwise specified, sample sizes shall conform to the following:
 - a. Paint Chips: Manufacturers' standard
 - b. Flat or Sheet Products: Minimum 6 inches square, maximum 12 inches square
 - c. Linear Products: Minimum 6 inches, maximum 12 inches long
 - d. Bulk Products: Minimum 1 pint, maximum 1 gallon
 5. Field Samples and Mock-ups shall conform to the applicable specifications and be created to provide appearance and finishes as approved by the City. Based on City's direction, Contractor shall construct or prepare as many additional samples as may be required to achieve desired textures, finishes, and/or colors.
 6. Accepted samples and mock-up shall serve as the standard of quality for the various units of work. Approved full-size samples and mock-ups may be incorporated in the Work upon approval, unless otherwise directed by the City.
 7. No review of a Sample shall be taken in itself to change or modify the requirements in the Contract Documents.

1.06 COORDINATION

- A. Structural Cutting: Contractor shall obtain specific positive written instructions from City before cutting beams or other structural members, walls, arches or lintel, and Contractor shall be guided by such instructions.

1.07 QUALITY CONTROL SUBMITTALS

- A. Contractor shall submit three (3) copies of all test reports or certificates to indicate that the applicable material or product conforms to or exceeds the contract requirements. Documents from recent and previous tests may be allowed at the sole discretion of the City.
- B. Contractor shall submit three (3) copies of manufacturers' Instructions, including printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing. Contractor shall notify City of any conflicts between manufacturer's instructions and Contract Documents.
- C. Contractor shall submit three (3) copies of material safety data sheets (MSDS) for any paints, solvents, thinners, varnish, lacquer, glues and adhesives, mastics, or other materials needed for the Work.

1.08 OPERATIONS AND MAINTENANCE MANUALS

- A. Contractor shall submit three (3) copies of manufacturers' operations and maintenance manuals. Operations and maintenance manuals shall include the following as appropriate:
1. Operating instructions
 2. Preventive maintenance instructions

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3. Cleaning instructions
4. Safety precautions
5. Trouble shooting procedures
6. Theory of operation to discrete component level
7. Schematic diagrams, flow diagrams, wiring diagrams, logic diagrams, etc., to discrete component level
8. Parts lists showing all discrete components with part number, current prices and availability
9. List of replaceable supplies; paper, ink, ribbon, etc., with part numbers, current prices and availability
10. Recommended levels of spare parts and supplies to keep on hand
11. Manufacturers' service and maintenance technical manuals
12. Names, addresses and telephone numbers of service and repair firms for the equipment

- B. Manuals shall be the same as are used by manufacturers' authorized technicians to completely service and repair the equipment.

1.09 DELAY OF SUBMITTALS

- A. Delay of submittals by Contractor is considered avoidable delay. Liquidated damages incurred because of late submittals will be assessed to Contractor.

PART 2 - Not Used

PART 3 - Not Used

END OF SECTION

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SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes regulatory requirements applicable to the Contract Documents.
- B. Specific reference in the Specifications to codes and regulations or requirements of regulatory agencies shall mean the latest printed edition of each adopted by the regulatory City at the date of submission of bids unless the document referenced is shown dated.
- C. Should any conditions develop not covered by the Contract Documents wherein the finished work will not comply with current codes, a change order detailing and specifying the required work shall be submitted to and approved by the Engineer before proceeding with the Work.

1.02 REFERENCES TO REGULATORY REQUIREMENTS

- A. Codes, laws, ordinances, rules and regulations referred to shall have full force and effect as though printed in full in these specifications. Code, laws, ordinances, rules and regulations are not furnished to Contractor, because Contractor is assumed to be familiar with their requirements.
- B. Conform to referenced codes, laws, ordinances, rules and regulations.
- C. Precedence
 - 1. Where specified requirements differ from the requirements of applicable codes, ordinances and standards, the more stringent requirements shall take precedence.
 - 2. Where Plans or Specifications require or describe products or execution of better quality, higher standard or greater size than required by applicable codes, ordinances and standards, Plans and Specifications shall take precedence so long as such standard does not violate any law.
 - 3. Where no requirements are identified on Plans or in Specifications, comply with all requirements of applicable codes, ordinances and standards of governing authorities having jurisdiction.

1.03 CODES

- A. Codes that apply to Contract Documents include, but are not limited to, the following:
 - 1. Cal. Building Code (Part 2, Title 24, C.C.R., including, without means of limitation, sections 16A, 102A.23, 308, 420A, 504-506, 904.2.6, 1019 and 1604)
 - 2. Cal. Electrical Code (Part 3, Title 24, C.C.R.)
 - 3. Cal. Mechanical Code (Part 4, Title 24, C.C.R.)
 - 4. Cal. Plumbing Code (Part 5, Title 24, C.C.R.),

1.04 LAWS, ORDINANCES, RULES AND REGULATIONS

- A. During prosecution of Work to be done under Contract Documents, comply with applicable laws, ordinances, rules and regulations, including, but not limited to, the following:

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- B. Federal
 - 1. Americans with Disabilities Act of 1990 CADA
 - 2. 29 CFR, Section 1910.1001, Asbestos
 - 3. 40 CFR, Subpart M, National Emission Standards for Asbestos
 - 4. Executive Order 11246

- C. State of California
 - 1. California Code of Regulations, Titles 5, 8, 19, 21, 22, 24 and 25
 - 2. California Public Contract Code
 - 3. California Health and Safety Code
 - 4. California Government Code
 - 5. California Labor Code
 - 6. California Civil Code
 - 7. California Code of Civil Procedure
 - 8. CPUC General Order 95, Rules for Overhead Electric Line Construction
 - 9. CPUC General Order 128, Rules for Construction of Underground Electric Supply and Communications Systems
 - 10. California Occupational Safety and Health Administration (Cal OSHA)
 - 11. Occupational Safety and Health Administration (OSHA): Hazard Communications Standards.

- D. State of California Agencies
 - 1. State and Consumer Services City
 - 2. Office of the State Fire Marshall
 - 3. Office of Statewide Health Planning and Development

- E. Local Agencies
 - 1. Bay Area Air Quality Management District
 - 2. City of Lafayette
 - 3. County of Contra Costa

- F. Other Applicable Laws, Ordinances and Regulations
 - 1. Work shall be accomplished in conformance with all applicable laws, ordinances, rules and regulations of Federal, State and local governmental agencies and jurisdictions having authority over the Project.
 - 2. Work shall be accomplished in conformance with all rules and regulations of public utilities and utility districts.
 - 3. Where such laws, ordinances rules and regulations require more care or greater time to accomplish Work, or require better quality, higher standards or greater size of products, Work shall be accomplished in conformance to such requirements with no change to the Contract Time and Contract Sum, except where changes in laws, ordinances, rules and regulations occur subsequent to the execution date of the Agreement.

1.05 COMPLIANCE WITH AMERICANS WITH DISABILITIES ACT

- A. Contractor acknowledges that, pursuant to the Americans with Disabilities Act (ADA), programs, services and other activities provided by a public entity to the public, whether directly or through a contractor, must be accessible to the disabled public. Contractor shall provide the services specified in this Agreement in a manner that complies with the ADA and any and all other applicable federal, state and local disability rights legislation. Contractor agrees not to discriminate against disabled persons in the provision of services, benefits or activities provided under this Agreement and further agrees that any violation of

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this prohibition on the part of Contractor, its employees, agents or assigns shall constitute a material breach of this Agreement.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

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SECTION 01 42 10

REFERENCES AND DEFINITIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes reference standards, abbreviations, symbols and definitions used in Contract Documents in addition to those specified in other Sections of Specifications. Full titles and edition dates may be given in this Section for standards cited in other Sections of Specifications.
- B. Material and workmanship specified by reference to number, symbol, or title of specific standard such as state standard, commercial standard, federal specifications, technical society, or trade association standard, or other similar standard shall comply with requirements of standards except when more rigid requirements are specified or required by applicable codes.
- C. Standards referred to, except as modified herein, shall have full force and effect as though printed in the Contract Documents. Standards are not furnished to Contractor, because manufacturers and trades involved are assumed to be familiar with their requirements.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code or laws or regulations in effect at the time of opening of Bids, including all amendments and supplements, except as may be otherwise specifically stated in the Contract Documents.
- B. If during the performance of the Work, Contractor discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such law or regulation applicable to the performance of the Work or of any such standard, specification, manual or code or of any instruction of any supplier, Contractor shall report it in writing at once by submitting a Request for Information to City, and Contractor shall not proceed with the Work affected thereby until consent to do so is given by City.
- C. No provision of any such standard, specification, manual, code or instruction shall be effective to change the duties and responsibilities of Contractor or any of his subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents, nor shall it be effective to assign to City or any of its consultants, agents or employees any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.
- D. Contractor shall comply with the applicable portions of standards and specifications published by the technical societies, institutions, associates and governmental agencies referred to in Specifications.

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- E. Referenced Grades Classes and Types: Where an alternative or optional grade, class or type of product or execution is included in a reference but is not identified in Plans or in Specifications, provide the highest, best and greatest of the alternatives or options for the intended use and prevailing conditions.
- F. Jobsite Copies:
1. Contractor shall obtain and maintain at the Project site copies of reference standards identified on Plans and in Specifications in order to properly execute the Work.
 2. At a minimum, the following shall be readily available at the site:
 - a. Model Codes: Uniform Building Code (UBC), Uniform Fire Code (UFC), Uniform Mechanical Code (UMC), Uniform Plumbing Code (UPC), NFPA 70-National Electric Code (NEC) and NFPA 101-Life Safety Code, including applicable amendments for jurisdiction in which Project is located.
 - b. State Codes: California Code of Regulations, Division of Industrial Safety regulations.
 - c. Safety Codes: State of California, Division of Industrial Safety regulations.
 - d. General Standards: UBC Standards, other model code standards, UL Building Products Listing, FM Approval Guide and ASTM Standards in Building Codes.
 - e. Fire and Life Safety Standards: All referenced standards pertaining to fire rated construction and exiting.
 - f. Common Materials Standards: American Concrete Institute (ACI), American Institute of Steel Construction (AISC), American Welding Society (AWS), Gypsum Association (GA), National Fire Protection Association (NFPA), Tile Council of America (TCA) and Woodwork Institute of California (WIC) standards to the extent referenced within the Specifications.
 - g. Research Reports: ICBO Research Reports and CABO National Evaluation Service Reports (NER) for all products used.

1.03 STANDARDS

- A. ACI (American Concrete Institute), Standard 318, Building Code Requirements for Reinforced Concrete
1. ACI 355.1, American Concrete Institute, "State-of-the-Art Report on Anchorage to Concrete".
- B. AISC (American Institute of Steel Construction), Specifications and Code of Standard Practice for Steel Buildings and Bridges
- C. ANSI (American National Standards Institute, formerly American Standards Association),
1. ANSI Z97.1
 2. AAISC 303
 3. ANSI/AISC 341 - Seismic Provisions for Structural Steel Buildings.
 4. ANSI/AISC 358 - Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications.
 5. ANSI/AISC 360 - Specification for Structural Steel Buildings.
 6. AISC - Steel Construction Manual
- D. Standard C2, NESC (National Electrical Safety Code)

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- E. ASTM (American Society for Testing and Materials) as noted in sections including ASTM E 488, "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements".
- F. RCSC – Research Council on Structural Connections "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- G. RCSC – Research Council on Structural Connections "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 1. AWS - American Welding Society's
 - 2. AWS D1.1 - Structural Welding Code - Steel.
 - 3. AWS D1.8 - Structural Welding Code - Seismic Supplement
- H. SSPC - Steel Structures Painting Council
- I. NAAWS Standard: Comply with applicable requirements of "North American Architectural Woodwork Standards" (NAAWS) adopted and published jointly by Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada and Woodwork Institute.
- J. Glass Association of North America (GANA) "Glazing Manual" and "Sealant Manual".
- K. Sealed Insulating Glass Manufacturers Association (SIGMA): TM-3000 "Vertical Glazing Guidelines" and TB-3001 "Sloped Glazing Guidelines".
- L. IAPMO (International Association of Plumbing and Mechanical Officials)
 - 1. UMC (Uniform Mechanical Code)
 - 2. UPC (Uniform Plumbing Code)
- M. ICBO (International Conference of Building Officials)
 - 1. UBC (Uniform Building Code)
 - 2. CBC (Californian Building Code)
 - 3. UFC (Uniform Fire Code)
- N. NFPA (National Fire Protection Association)
 - 1. Pamphlet 1, Fire Prevention Code
 - 2. Pamphlet 13 and 14, Sprinkler Systems, Installation
 - 3. Pamphlet 24, Private Fire Service Mains
 - 4. Pamphlet 70, NEC (National Electric Code)
 - 5. Pamphlet 71, Signaling Systems, Central Station
 - 6. Pamphlet 101, Life Safety Code
- O. California Code of Regulations
 - 1. Title 8 Industrial Relations
 - 2. Title 19 Public Safety
 - 3. Title 24 Building Standards
 - 4. California Labor Code
- P. City of Lafayette Standard Specifications (March 2013), referred to as the "Standard Specifications" in the Contract Documents, except where expressly modified by provisions of these Project Specifications.

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- Q. State of California Department of Transportation Standard Plans and Standard Specifications (2010 Edition), referred to as the “State Standard Plans” and “State Standard Specifications” in the Contract Documents, except Sections 1 through 9 of said specifications, which are expressly excluded from incorporation herein.
- R. Contra Costa County Public Works Department Standard Plans, latest non-metric version, referred to as “County Standard Plans or Details” in the Contract Documents.
- S. City of Lafayette Basic Construction Guidelines for Tree Preservation.

1.04 ABBREVIATIONS

- A. Listed below are the various organizations or references which may appear in the Contract Documents, along with their respective acronyms and/or abbreviations:

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ABMA	American Boiler Manufacturers Association
ABPA	American Board Products Association
ACI	American Concrete Institute
AGA	American Gas Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute (formerly American Standards Association)
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWCI	Association of the Wall and Ceiling Industries
AWPA	American Wood Protection Association
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association
Cal/OSHA	California Occupational Safety and Health Administration
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPUC	California Public Utilities Commission
CRA	California Redwood Association
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards, U.S. Department of Commerce
CTI	Ceramic Tile Institute
DHI	Door and Hardware Institute
FGMA	Flat Glass Marketing Association

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FM	Factory Mutual
FS	Federal Specifications
GA	Gypsum Association
HPMA	Hardwood Plywood Manufacturers Association
HVAC	Heating, Ventilating and Air Conditioning
IACS	International Annealed Copper Standards
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers, Inc.
IES	Illuminating Engineering Society
JATC	Joint Apprenticeship Training Committee
MIA	Masonry Institute of America
MIA	Marble Institute of America
MLSFA	Metal Lath/Steel Framing Association
MSS	Manufacturers Standardization Society of the Valve & Fitting Industry
NAAMM	National Association of Architectural Manufacturers
NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electric Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NOFMA	National Oak Flooring Manufacturers Association
NSF	National Sanitation Foundation
NTMA	National Terrazzo & Mosaic Association
NWWDA	National Wood Windows and Doors Association
OSA	Division of State Architect (formerly known as the Office of the State Architect)
PCA	Portland Cement Association
PCI	Pre-stressed Concrete Institute
PDI	Plumbing and Drainage Institute
PS	Product Standard, U. S. Department of Commerce
RIS	Redwood Inspection Service
SDI	Steel Deck Institute
SFM	State of California, Office of State Fire Marshal
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joint Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPIB	Southern Pine Inspection Bureau
SSPC	Steel Structures Painting Council
SWI	Steel Window Institute
TCA	Tile Council of America
UBC	Uniform Building Code
UFC	Uniform Fire Code
UL	Underwriters Laboratories, Inc.
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
WCLIB	West Coast Lumber Inspection Bureau
WIC	Woodwork Institute of California
WHI	Warnock Hersey International
WWPA	Western Wood Products Association

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1.05 DEFINITIONS

- A. Wherever any of the words or phrases defined below, or a pronoun used in place thereof, is used in any part of the Contract Documents, it shall have the meaning here set forth:

ADDENDA: Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding requirements or the Contract Documents. Addenda shall not include the minutes of the Pre-bid Conference and Site Visit.

AGREEMENT (Document 00 52 10): Agreement is the basic contract document that binds the parties to construction Work. Agreement defines relationships and obligations between City and Contractor and by reference incorporates Conditions of Contract, Plans, Specifications, and contains Addenda and all Modifications subsequent to execution of Contract.

ALTERNATE: Work added to or deducted from the Base Bid, if accepted by City.

APPROVED EQUAL or EQUAL: Approved in writing by City as being of equivalent quality, utility, durability, strength, appearance, design, and performance. Contractor has the burden to demonstrate equality, and City has the sole discretion to accept or reject a proposal as being "Approved Equal" or "Equal."

ARCHITECT: The person holding a valid California State Architect's license, whose firm has provided architectural services on the Project, and who may have engaged engineering subconsultants to provide services on Project. When Architect is referred to within the Contract Documents with respect to providing review, inspection, or approval of any kind, it shall mean the Engineer.

BID: The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

BIDDER: Prime contractor who submits a Bid.

BIDDING DOCUMENTS: All documents comprising the Project Manual (including all documents and specification sections listed on Document 00 00 10 Table of Contents), including documents supplied for bidding purposes only and Contract Documents.

BUILDING DEPARTMENT: Contra Costa County Building Inspection Department.

BY CITY: Work that will be performed by City or its agents at the City's expense.

BY OTHERS: Work that is outside scope of Work to be performed by Contractor under this Contract, which will be performed by City, other contractors, or other means.

CHANGE ORDER: A written instrument prepared by City and signed by City and Contractor, stating their agreement upon all of the following:

- a. a change in the Work,
- b. the amount of the adjustment in the Contract Sum, if any, and

CITY: City of Lafayette, a Municipal Corporation.

CODE INSPECTOR: A local or state City responsible for the enforcement of applicable codes and regulations. This includes, without limitation: Contra Costa County Building

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Inspection Department; City Engineering Division; Contra Costa Fire Protection District; and various utility districts serving Contra Costa County.

CONCEALED: Work not exposed to view in the finished Work, including within or behind various construction elements such as furred spaces, embedded construction, shafts, and hung ceilings.

CONSTRUCTION MANAGER: The Engineer or his/her representative.

CONTRACT CONDITIONS: Any provision(s) of the entire contract provisions, including but not limited to the agreement, general conditions, their supplements, and the specifications.

CONTRACT DOCUMENTS or PROJECT DOCUMENTS: Contract Documents shall consist of the documents identified as the Contract Documents in Document 00 52 10 Agreement, plus all changes, addenda and modifications thereto.

CONTRACT MODIFICATION: Either a written amendment to the Contract signed by Contractor and the City or a Change Order.

CONTRACT SUM: The sum stated in the Agreement and, including authorized adjustments, the total amount payable by City to Contractor for performance of the Work and the Contract Documents. The Contract Sum is also referred to as the Contract Price, Contract Payment, or the Contract Amount.

CONTRACT TIMES: The number or numbers of days or the dates stated in the Agreement (i) to achieve Completion of the Work or designated milestones and/or (ii) to complete the Work so that it is ready for final payment and is accepted.

CONTRACTOR: The person or entity identified as such in the Agreement and referred to throughout the Contract Documents as if singular in number and masculine or neuter in gender, also referred to as Prime Contractor. The term "Contractor" means the Contractor or his authorized representative. Imperative sentences in the Contract Documents shall be interpreted to mean "Contractor" as the subject of those sentences.

CONTRACTOR'S EMPLOYEES: Persons engaged in execution of Work under Contract as direct employees of Contractor, as subcontractors, or as employees of subcontractors.

DAY: One calendar day, unless the word "day" is specifically modified to the contrary.

DEFECTIVE WORK: Refers to Work that is unsatisfactory or unsuited for the use intended, faulty, or deficient, that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents (including but not limited to approval of samples and "or equal" items), or has been damaged prior to final payment (unless responsibility for the protection thereof has been assumed by City). The Engineer is the judge of whether Work is defective.

DRAWINGS OR PLANS: The graphic and pictorial portions of Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams. Also called Project Drawings.

ENGINEER: An employee of the City and its sole authorized representative on the Project.

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EXPOSED: Work exposed to view in the finished Work, including behind louvers, grilles, registers and various other construction elements.

FIELD DIRECTIVE: A written work change directive to Contractor from the Engineer ordering alterations or modifications which may result in a change in Contract Sum or Contract Time.

FINAL COMPLETION: A state of the Work when all construction has been completed, including completion of punch list work, and Work is ready for Final Acceptance by action of the City of Lafayette City Council as satisfactorily completed in accordance with Contract Documents. Requirements for Final Completion include all of, but are not limited to, the following:

- a. All Systems having been tested and accepted as having met requirements of Contract Documents.
- b. All required instructions and training sessions having been given by Contractor.
- c. All as-built drawings and operations and maintenance manuals and Machine Inventory Sheets having been submitted by Contractor, reviewed and accepted by the Engineer.
- d. All punch list work, as directed by the Engineer, having been completed by Contractor.
- e. Generally all Work, except Contractor maintenance after Final Acceptance, having been completed to satisfaction of City.
- f. All applicable permits signed off.

FIRE MARSHALL, FIRE DISTRICT: Contra Costa County Fire Protection District.

FORCE-ACCOUNT: Work directed to be performed without prior agreement as to lump sum or unit price cost thereof, and which is to be billed at cost for labor, materials, equipment, taxes, and other costs, plus a specified percentage for overhead and profit.

FURNISH: Supply and deliver to the jobsite.

INDICATED: Shown or noted on the Drawings.

INSTALL: Includes furnishing and installing a work item in place; would mean "install or apply" only when Contract Document specifically states that others will "furnish."

LATENT: Not apparent by reasonable inspection, including but not limited to, the inspections and research required as a condition to bidding under the General Conditions.

MATERIAL OR MATERIALS: These words shall be construed to embrace machinery, manufactured articles, materials of construction (fabricated or otherwise), and any other classes of material to be furnished in connection with Contract, except where a more limited meaning is indicated by context.

MILESTONE: A principal event specified in Contract Documents relating to an intermediate completion date or time.

MODIFICATION: Same as Contract Modification.

NOT IN CONTRACT: Work that is outside the scope of work to be performed by Contractor under this Contract.

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NOTICE OF COMPLETION: Shall have the meaning provided in California Civil Code Section 3093, and any successor statute.

OFF SITE: Outside geographical location of the Project.

OWNER: The City of Lafayette, City Council, officials, officers, employees, and agents.

PROGRESS REPORT: a periodic report submitted by Contractor to City with progress payment invoices accompanying actual work accomplished to the Progress Schedule.

PROJECT: Total construction of which Work performed under this Contract may be whole or part.

PROJECT INSPECTOR: A person engaged by City to provide general observation of the Work. The inspector reports to the Engineer.

PROJECT MANAGER: The Engineer.

PROJECT SPECIFICATIONS: Consists of Bidding and Contract Requirements, Agreement, Bonds, Certificates, General Conditions, and Technical Specifications, as outlined in the Table of Contents. Specifications may be contained in the Project Manual and may be referred to as Special Provisions.

PROVIDE: Furnish and connect or install complete in place, ready for regular operation.

REQUEST FOR INFORMATION ("RFI"): A document prepared by Contractor requesting information regarding the Project or Contract Documents. The RFI system is also a means for City to submit Contract Document clarifications or supplements to Contractor.

REQUEST FOR SUBSTITUTION ("RFS"): A document prepared by Contractor requesting substitution of materials as and to the extent permitted in Contract Documents.

SAMPLES: Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

SHOP DRAWINGS: All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the work.

SHOWN: As indicated on the Drawings.

SITE: The particular geographical location of Work performed pursuant to Contract.

SPECIFICATIONS: The written portion of the Contract Documents consisting of requirements for materials, equipment, construction systems, standards and workmanship for the Work, and performance of related services; and are contained in Divisions 01 through 49. Also called Project Specifications or Contract Specifications.

SPECIFIED: As stated in any part of the Contract Documents.

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SUBCONTRACTOR: A person or entity who has a direct contract with Contractor to perform a portion of the Work at the site. The term “subcontractor” is referred to throughout the Contract Documents as if singular in number and neuter or masculine in gender and means a subcontractor or an authorized representative of the subcontractor. The term “subcontractor” does not include a separate contractor or subcontractors of a separate contractor.

SUBSTANTIAL COMPLETION: The Work (or a specified part thereof) has progressed to the point where, in the opinion of the Engineer, the Work is sufficiently complete, in accordance with Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended and ready for final payment less retention. Achieving Substantial Completion does not constitute acceptance of work, does not stop the tolling of contract time, and does not prevent the enforcement of liquidated damages.

TESTING AND SPECIAL INSPECTION CITY: An independent entity engaged by City to inspect and/or test the workmanship, materials, or manner of construction of buildings or portions of buildings, to determine if such construction complies with the Contract Documents and applicable codes.

UNDERGROUND FACILITIES: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: Electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

WORK: The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents within the Contract Time. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents including everything shown in the Plans and set forth in the Conditions and Specifications.

WORKING DAY: A working day is any day except Saturday, Sunday, and City of Lafayette holidays.

- B. Wherever words “as directed,” “as required,” “as permitted,” or words of like effect are used, it shall be understood that direction, requirements, or permission of the Engineer is intended. Words “sufficient,” “necessary,” “proper,” and the like shall mean sufficient, necessary or proper in judgment of the Engineer. Words “approved,” “acceptable,” “satisfactory,” “favorably reviewed” or words of like import, shall mean approved by, or acceptable to, or satisfactory to, or favorably reviewed by the Engineer.
- C. Wherever the word “may” is used, the action to which it refers is discretionary. Wherever the word “shall” is used, the action to which it refers is mandatory.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

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SECTION 01 45 24

TESTING AND INSPECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section contains requirements for the following:
 - 1. Contractor's quality control.
 - 2. Quality of the Work.
 - 3. Inspections and tests by governing authorities.
 - 4. Inspections and tests by serving utilities.
 - 5. Inspections and tests by manufacturer's representatives.
 - 6. Inspections by Independent Testing and Inspection City.

- B. Related Section
 - 1. Section 01 41 00 - Regulatory Requirements: Compliance with applicable codes, ordinances and standards.

1.02 CONTRACTOR'S QUALITY CONTROL

- A. Contractor shall ensure that products, services, workmanship and site conditions comply with requirements of Contract Documents by coordinating, supervising, testing and inspecting the work and by utilizing only suitably qualified personnel.

- B. Work shall be accomplished in accordance with quality requirements of Plans and Specifications, including, by reference, all codes, laws, rules, regulations and standards. When no quality basis is prescribed, the quality shall be in accordance with the best-accepted practices of the construction industry for the locale of the Project, for projects of this type.

- C. Contractor shall employ and assign knowledgeable and skilled personnel as necessary to perform quality control functions to ensure that the Work is provided as required.

1.03 QUALITY OF THE WORK

- A. Unless otherwise indicated or specified, all products shall be new, free of defects and fit for the intended use.

- B. All Work shall be produced plumb, level, square and true, or true to indicated angle, and with proper alignment and relationship between the various elements.

- C. Contractor shall take all measures necessary to preserve completed Work free from damage, deterioration, soiling and staining, until final acceptance by the City.

- D. Contractor shall document and explain all deviations from reference standards, building code report requirements, and manufacturer's product installation instructions and recommendations, including acknowledgement by the manufacturer that such deviations are acceptable and appropriate for the Project.

1.04 INSPECTIONS AND TESTS BY GOVERNING AUTHORITIES

- A. Contractor shall comply with California Building Code (CBC) requirements and all other requirements of governing authorities having jurisdiction.

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- B. Contractor shall cause all tests and inspections required by governing authorities having jurisdiction to be made for Work under this Contract.
1. Such authorities include City of Lafayette Engineering Department, Contra Costa County Building Inspection Department, Contra Costa County Fire Protection District, and other similar agencies having jurisdiction.
 2. Except as specifically noted, scheduling, conducting and paying for such inspections shall be solely the Contractor's responsibility.
 3. Contractor shall notify the Engineer in writing during normal business hours, Monday through Friday, at least 48 hours before any inspections.

1.05 INSPECTIONS AND TESTS BY SERVING UTILITIES

- A. Contractor shall cause all tests and inspections required by serving utilities to be made for Work under this Contract. Provisions of 1.04.B.2 and 1.04.B.3 above shall apply.

1.06 INSPECTIONS AND TESTS BY MANUFACTURER'S REPRESENTATIVES

- A. Contractor shall cause all tests and inspections specified to be conducted by materials or systems manufacturers to be made. Provisions of 1.04.B.2. and 1.04.B.3. above shall apply.

1.07 INSPECTIONS BY INDEPENDENT TESTING AND INSPECTION CITY

- A. City may select and pay for an independent testing and inspection City or agencies to conduct tests and inspections as indicated on Plans and in Specifications outside requirements by governing authorities having jurisdiction.
- B. Contractor shall notify City in writing when Work is ready for specified tests and inspections. This written notification should be delivered during normal business hours, Monday through Friday, at least 72 hours before the requested inspection date.
- C. Contractor shall pay for all additional charges by testing and inspection agencies due to the following:
1. Contractor's failure to properly schedule or notify the Engineer;
 2. Changes in sources, lots or suppliers of products after original tests or inspections;
 3. Changes in means methods, techniques, sequences and procedures of construction that necessitate additional testing, inspection and related services;
 4. Changes in mix designs for concrete and mortar after review and acceptance of submitted mix design;
 5. Contractor submitted requests to change materials or products, which are accepted, but require testing and/or reinspection beyond original design;
 6. Costs of travel, and per diem to perform factory testing on-sites over 50 miles from the jobsite;
 7. Cost of re-testing work due to failure of the original test.
- D. Tests and special inspections to be paid by the City shall include the following:
- Special Inspections
 - Structural steel welding
 - Structural steel bolting
 - Epoxy anchors
 - Mechanical anchors

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And as specified in the Contra Costa County Building Permit, project drawings and specifications.

- E. Contractor Responsibilities in Inspections and Tests
1. Contractor shall notify City during normal business hours, Monday through Friday, 24 hours in advance of expected time of each test and inspection to be conducted on the project site and for all other operations requiring inspection and testing services, by submitting Contractor's inspection request form. For off-site testing within 50 miles of jobsite, 72 hours' notice, and beyond 50 miles, 5 working days' notice is required.
 - a. When tests or inspections cannot be performed after such notice due to factors under Contractor's control, Contractor shall reimburse City for testing laboratory personnel and travel expenses incurred.
 2. Contractor shall deliver to laboratory or designated location adequate samples of materials proposed to be used that require advance testing, together with proposed mix designs.
 3. Contractor shall cooperate with testing and inspection City personnel and provide access to Work areas and off-site fabrication and assembly locations, including during weekends and after normal work hours.
 4. Contractor shall provide incidental labor and facilities to provide safe access to Work to be tested and inspected, to obtain and handle samples at the Project site or at source of products to be tested, and to store and cure test samples.

1.08 ADDITIONAL TESTING AND INSPECTION

- A. If initial tests or inspections made by the testing laboratory reveal that materials do not comply with Contract Documents, or if City has reasonable doubt that materials do not comply with Contract Documents, additional tests and inspections shall be made as directed.
1. If additional tests and inspections establish that materials comply with Contract Documents, City shall pay all costs for such tests and inspections.
 2. If additional tests and inspections establish that materials do not comply with Contract Documents, all costs of such tests and inspections shall be the responsibility of the Contractor.
 3. If Work requiring inspection is covered by follow-on work before it is inspected, Contractor shall uncover work so proper inspections can be performed. All costs of such tests and inspections shall be the responsibility of the Contractor.

END OF SECTION

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SECTION 01 53 00

TEMPORARY CONSTRUCTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section contains requirements for the following:
 - 1. Temporary facilities
 - 2. Temporary utilities
 - 3. Temporary ventilation
 - 4. Scaffolding
 - 5. Temporary enclosures
 - 6. Barriers
 - 7. Construction traffic routes and site parking
 - 8. Maintaining access
 - 9. Debris control
 - 10. General safety and security
 - 11. Engineer's field office
 - 12. Field office furnishings
 - 13. Removal of temporary facilities

1.02 TEMPORARY FACILITIES

- A. Section 5-12 of the General Provisions of the Standard Specifications shall apply regarding construction staging. No staging or storage of any kind is allowed on public streets, on adjacent properties and on any land outside the property lines of the project site.

1.03 TEMPORARY UTILITIES

- A. Contractor shall provide temporary data, phone, and other utilities needed for the work. Power and water may be available from existing building connection.
- B. Contractor shall apply for, coordinate, schedule, and obtain all necessary permits for temporary utilities, including payment of any permit fees charged by entities other than the City of Lafayette. City fees will be waived.
- C. In the event of power failures by others, the Contractor shall provide a temporary generator of sufficient size to continue the Work within 24 hours of interruption of power. This service will be provided by the Contractor at no additional cost to the City.

1.04 TEMPORARY VENTILATION

- A. Enclosed areas shall be ventilated to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases. Contractor shall identify potential problems associated with dust, fumes, vapors or gases, and implement procedures which will mitigate these problems appropriately.

1.05 SCAFFOLDING

- A. Contractor shall furnish, erect and maintain all required scaffolding for the work of this Project in conformance with all applicable safety requirements. Scaffolding and accessories shall also conform to all regulations governing such equipment. Upon

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completion of use, Contractor shall remove all scaffolding and accessories from the Site.

1.06 TEMPORARY ENCLOSURES

- A. Contractor shall provide temporary weather-tight enclosure of exterior walls for successive areas of building as work progresses, as necessary, to provide acceptable working conditions and to provide weather protection for materials. Said enclosures shall provide for effective temporary heating if needed and shall prevent entry of unauthorized persons.

1.07 BARRIERS

- A. Contractor shall provide and maintain barriers as required to prevent public entry into construction areas and to protect existing facilities and adjacent properties from damage.
- B. Contractor to provide and maintain barriers to provide separation between construction site access and on-going community center operations.

1.08 CONSTRUCTION TRAFFIC ROUTES AND SITE PARKING RESTRICTIONS

- A. Specific traffic routing and parking restrictions are as follows:
 - 1. Parking on residential streets adjacent to the Site, and parking lot is prohibited and construction vehicles will be towed at Contractor's expense. Additionally, by way of ascertaining and fixing the amount of damage, and not by way of penalty, the Contractor shall pay the City the sum of \$200 per construction worker vehicle parked in a nearby residential area per day.
 - 2. Contractor can negotiate with any entity to accommodate parking for its workers. However, the City does not make any guarantee that such parking is legal or available to the Contractor.

1.09 MAINTAINING ACCESS

- A. Contractor shall be responsible for ascertaining and accommodating the access needs of public, and businesses affected by construction activities on a daily basis. Contractor shall notify the Engineer and affected parties about driveway or walkway closures and impacts 48 hours in advance of the work causing said impacts. Contractor's attention is also directed to provisions governing use of the Site as stipulated in General Conditions (Document 00 72 00).

1.10 DEBRIS CONTROL

- A. Contractor shall maintain all areas under his control free of extraneous debris and litter, including the construction site, storage and parking areas, and along access and haul routes.
 - 1. Contractor shall provide containers for deposit of debris.
 - 2. Contractor shall prohibit overloading of trucks to prevent spillages on access and haul routes.
 - 3. Contractor shall sweep access roads and haul routes as directed by the Engineer.
- B. Contractor shall schedule periodic collection and disposal of debris to prevent accumulation or as directed by the Engineer.

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1.11 GENERAL SAFETY AND SECURITY

- A. Section 6-11.1 of the General Provisions of the Standard Specifications shall apply.
- B. Contractor shall ensure that no alcohol, firearms, weapons, or controlled substance enters or is used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employees found in violation of this provision.
- C. The wearing of hard hats and face masks will be mandatory at all times for personnel on Site. Contractor shall supply sufficient hard hats and face masks to equip properly all employees and visitors.

1.12 REMOVAL OF TEMPORARY FACILITIES

- A. Maintain all temporary facilities, staging area and controls as long as needed for the safe and proper completion of the Work. Promptly clean and repair damage caused by installation or use of temporary facilities. Restore site including staging area(s) to condition equal to or better than the condition prior to the installation of the temporary facilities. If the Contractor fails or refuses to repair the damage promptly, the City may have the necessary work performed, and the costs incurred shall be withheld from any payments due or to become due to the Contractor.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

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SECTION 01 56 50

SITE WASTE MANAGEMENT PROGRAM

PART 1 - GENERAL

1.01 SUMMARY

- A. Project requires special Site Waste Management Program as follows:
 - 1. Project shall have minimum 65% of total demolition and construction waste, by weight, diverted from landfill by reuse or recycling.
 - 2. Contractor shall inform the Engineer in writing where Site Waste Management Program requirements could detrimentally impact construction schedule.
 - 3. Contractor shall implement optimum control of solid wastes and prevent environmental pollution and damage.

- B. Related Work
 - 1. Section 01 53 00 - Temporary Construction.

1.02 SUBMITTALS

- A. The Contractor shall submit a Waste Management Plan (WMP) using Green Halo Systems, a free web-based service for waste diversion and recycling tracking. Through Green Halo, the Contractor can establish, monitor, and document waste management compliance online. A Green Halo account can be set up at www.lafayette.wastetracking.com, or over the phone at **1-888-525-1301**.

- B. Within fourteen calendar days of the Notice to Proceed, the Contractor shall submit a WMP to City using Green Halo to include the following:
 - 1. Identification of all the materials estimated to be recycled, salvaged, or disposed; and
 - 2. Identification of certified construction and demolition waste processing facilities to which the various material types will go. (A list of available facilities may be obtained from the Central Contra Costa Solid Waste Authority, www.recyclesmart.org/node/81 .)
 - 3. Confirmation that the diversion rate is at least 65%.

- C. Contractor's WMP is subject to City review and approval. No work shall commence until approval of WMP is obtained. Delay in submitting a conforming WMP by Contractor shall not constitute sufficient ground for requesting project time extensions or the suspension of tolling of project time.

- D. If unique circumstances make it infeasible to comply with the diversion requirement, Contractor may apply for an exemption at the time the WMP is submitted. Increased or unanticipated costs to the Contractor shall not constitute sufficient basis for an exemption. The exemption request shall indicate the minimum rate of diversion believed to be feasible for each material and the specific circumstances that make it infeasible to comply with the diversion requirement.

- E. Contractor shall submit an updated WMP with each application for progress payment, including receipts, manifests, weight tickets, and/or invoices from the certified facilities that collected or received each material showing the actual volume or weight of the material received and how the material was disposed of.

- F. With the request for final inspection, Contractor shall submit its final WMP through Green Halo Systems for review. This submittal shall provide documentation to the City

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showing that the diversion requirement has been met, including the documentation specified above and any additional information that Contractor determines to be relevant to demonstrate its efforts to comply in good faith with the diversion requirement

- G. City shall withhold 50% of the Project retention due to Contractor until Contractor submits a final WMP that demonstrates either full compliance of or a good-faith effort to achieve the required diversion rate. When the full diversion requirement has not been met, City will make a good-faith-effort determination based on Contractor's documented diversion effort in context of the project size, nature of work, and availability of markets for waste processing. A finding of insufficient good-faith effort by Contractor shall constitute non-compliance of these Specifications. City's determination shall be at its sole discretion and final.
- H. Rebates, tax credits, and other savings obtained for recycled or re-used materials shall accrue to Contractor.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

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SECTION 01 59 00

CITY MITIGATION MEASURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Air Quality
 - 2. Noise Reduction
 - 3. Working Hours
 - 4. Waste Management Plan

- B. Related Section
 - 1. Document 00 72 00 - General Conditions.

1.02 AIR QUALITY. Contractor shall:

- A. Cover all trucks hauling any loose materials, or maintain at least 2 feet of freeboard on all hauling trucks;

- B. Pave, or apply water three times daily, or apply nontoxic soil stabilizers on all unpaved roads, parking areas, and construction staging areas;

- C. Sweep daily with water sweepers all paved access roads, parking areas, and staging areas at or in the vicinity of the construction sites as needed to prevent dust;

- D. Sweep adjacent streets daily with water sweepers, if visible soil material is carried onto such streets;

- E. Use dust-proof chutes for loading construction debris onto trucks. Alternative means of loading construction debris may be permitted if approved by the City. Contractor shall suspend dust-producing activities during periods of high winds when dust control measures are unable to avoid visible dust plumes.

1.03 NOISE REDUCTION

- A. The use of impulse tools (e.g., hoe-ram, jackhammers, etc.) shall be limited to the hours of 8:30 AM to 4:30 PM.

- B. All construction equipment shall be muffled and properly maintained. Contractor shall use noise reduction devices, measures, and equipment to minimize noise impacts on adjacent properties to the maximum extent practicable.

1.04 WORKING HOURS - Working hours shall conform to Section 8-8 of the General Provisions of the Standard Specifications, unless otherwise stated in these Project Specifications.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

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SECTION 01 62 00

PRODUCT OPTIONS

PART 1- GENERAL

1.01 SUMMARY

- A. Procedures are described for selecting products and requesting substitutions of unlisted materials in lieu of materials named in the specifications or approved for use in Addenda.
- B. Related Sections
 - 1. Section 01 25 10: Modification Procedures
 - 2. Section 01 33 10: Submittals

1.02 GENERAL REQUIREMENTS

- A. Contractor shall supply new materials and products except where specifically allowed by the Contract Documents. For products specified only by reference standards, Contractor may select any product meeting that standard. For products specified by naming one or more products or manufacturers, Contractor may select any of the named products meeting specifications.
- B. Materials to be supplied in quantity within a Specifications section shall be by the same manufacturer and interchangeable. Equipment and systems (e.g.: trellis system) shall also be composed of materials from a single manufacturer unless otherwise recommended by the equipment and system manufacturer or otherwise allowed in the Contract Documents.

1.03 QUALITY ASSURANCE

- A. Contractor shall comply with industry standards and applicable codes except when more restrictive tolerances or requirements indicate more rigid standards or precise workmanship.
- B. Work shall be performed by persons qualified to produce workmanship of specified quality. Products shall be installed straight, true-to-line, and in correct relationship to adjacent materials, with hairline joints, free of rough, sharp and potentially hazardous edges.
- C. Products shall be secured in place with positive anchorage devices designed and sized to withstand stresses, vibration, and cracking. Work shall conform to Code requirements for seismic anchors.

1.04 DELIVERY, STORAGE, AND HANDLING. Contractor shall:

- A. Transport products by methods to avoid product damage and deliver products in undamaged condition in manufacturer's unopened containers or packaging.
- B. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.
- C. Store sensitive products in weather-tight enclosures; maintained within temperature and humidity ranges required by manufacturer's instructions.

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- D. Place fabricated products on sloped supports above ground for exterior storage.
- E. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- F. Arrange storage to provide access for inspection and periodically inspect to assure products are undamaged and are maintained under required conditions.
- G. Provide equipment and personnel to handle products by methods to prevent soiling and prevent damage.
- H. Promptly inspect shipments to assure that products comply with specifications, quantities are correct, and products are undamaged.
- I. Immediately remove any products that are damaged, wet, stained, and products with mold or mildew.

1.05 INSPECTION NOTIFICATION

- A. Within five (5) calendar days of receiving a product to be used in the Work, Contractor shall inspect the products in conformance with Paragraph 1.04H above and provide written notification to the Engineer that he/she has done so, and to provide the City with the opportunity to perform its own inspection of the product. Failure to notify shall cause the Contractor to bear sole responsibility for any delay in the Project schedule due to the need to exchange or substitute the product in question, even if the product can be construed as meeting specifications and such exchange or substitution is initiated by the City; and Contractor shall not have ground to request an extension of Contract time or be relieved from liquidated damages. Providing the notification as required by these provisions shall not relieve the Contractor from his obligation to comply with any of the other Contract requirements.

1.06 SUBSTITUTIONS

- A. City will consider Contractor's substitution requests only when a product becomes unavailable due to no fault of Contractor. Requests for review of proposed substitute items (RFS) will not be accepted from anyone other than Contractor. The RFS will state the extent to which the evaluation and acceptance of the proposed substitute will prejudice Contractor's achievement of Project completion on time, and whether acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with City for work on the Project).
- B. Contractor shall submit separate RFS for each product and provide any supporting information as requested by the Engineer to render a decision on the request.
- C. Where required, Contractor shall itemize a comparison of the proposed substitution with product specified and list significant variations, including but not limited to dimensions, weights, service requirements, and functional differences. If a variation from product specified is not pointed out in submittal, that variation will be rejected even though submittal was favorably reviewed.
- D. Contractor shall state whether the substitute will require a change in any of the Contract Documents (or provisions of any other direct contract with City for work on the Project) to adapt the design of the proposed substitute, and whether or not incorporation or use of the

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substitute in connection with Work is subject to payment of any license fee or royalty.

- E. Contractor shall include accurate cost data comparing proposed substitution with product and amount of net change in Contract price, including but not limited to, an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by City in evaluating the proposed substitute. City may require Contractor to furnish additional data about the proposed substitute.
- F. City will not consider substitutions for acceptance when they will result in delay in meeting construction milestones or completion dates, or they will disrupt Contractor's job rhythm or ability to perform efficiently.
- G. City will determine acceptability of proposed substitutions and reserve right to reject proposals due to insufficient information.
- H. Accepted substitutions will be evidenced by a change order. All Contract Documents requirements apply to Work involving substitutions.
- I. Requests constitute a representation and warranty that Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product
 - 2. Will provide the same warranty for substitution as for specified product
 - 3. Will coordinate installation and make other changes, which may be required for Work to be complete in all respects, and be responsible for schedule delay of any kind due to substitution
 - 4. Waives claims for additional costs, which may subsequently become apparent
 - 5. Will compensate City for all costs of any kind related to the substitution and any claims brought against City, caused by late requests for substitutions or late ordering of products.
- J. Specified products, materials, or systems for Project may include engineering or on-file standards required by regulatory agencies. Contractor's substitution of products, materials or systems may require either additional engineering, testing, reviews, approvals, assurances, or other information for compliance with these requirements or both. Contractor shall provide all City approvals or other additional information required and pay additional costs for required City services made necessary by the substitution. These costs shall not be grounds for an increase in Contract Sum or Schedule time.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

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SECTION 01 73 10

EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section describes execution requirements, including:
 - 1. Installer qualifications.
 - 2. Examination.
 - 3. Manufacturer's instructions.
 - 4. Installation.
 - 5. Cleaning.
 - 6. Protection.

- B. Related Requirements
 - 1. Section 01 77 10: Contract closeout.

1.02 INSTALLER QUALIFICATIONS

- A. Installers shall have minimum five years of successful experience installing items similar to those required for the Project, except for individuals in training under direct supervision of experienced installer.
- B. Installer shall be certified or licensed by the manufacturer to provide the installation if so required by the product manufacturer.

1.03 EXAMINATION

- A. Acceptance of Conditions: Beginning installation of a product signifies installer has examined substrates, areas, and conditions for compliance with manufacturer requirements for tolerances and other conditions affecting performance.
- B. Field Measurements: Installer shall take field measurements as required to fit Work properly; and recheck measurements prior to installing each product.
 - 1. Where portions of the Work are to fit to other construction, installer shall verify dimensions of other construction by field measurements before fabrication, and allow for cutting and patching in order to avoid delaying the Work.
- C. Space Requirements: Installer shall verify space requirements and dimensions of items shown diagrammatically on the Project Plans.

1.04 MANUFACTURER'S INSTRUCTIONS

- A. When Work is specified to comply with manufacturers' recommendations or instructions, Contractor shall distribute copies to parties involved and maintain one set in field office.
- B. Contractor shall perform Work in accordance with details of recommendations and instructions and specified requirements. Where manufacturer's information notes special recommendations in addition to installation instructions, Contractor shall comply with both recommendations and instructions.

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- C. If more restrictive requirements are specified by the Contract or the Engineer, they shall govern.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Locate the Work and components accurately, in correct alignment and elevation. Vertical Work shall be plumb, and horizontal Work level.
 - 1. Installation shall allow space for maintenance and ease of removal for replacement.
- B. Install products at time and under conditions to ensure best possible results; and maintain conditions required for product performance until final completion.
- C. Conduct operations so no part of Work is subject to damaging operations or loading in excess of that expected during normal conditions.
- D. Securely anchor permanent construction in place, accurately located and aligned with other portions of Work.
- E. Allow for building movement including thermal expansion and contraction.
- F. Make joints of uniform width; arrange joints as indicated, for best visual effect where not otherwise indicated; and fit exposed connections together to form hairline joints except where otherwise indicated.

3.02 CLEANING

- A. Contractor shall at all times keep the Project Site free from accumulations of waste material or rubbish, and maintain the area in a clean and orderly fashion. The Work site and the floor shall be swept daily.
- B. Progress Cleaning: Contractor shall keep installed areas clean using cleaning materials specifically recommended by manufacturers of product being cleaned; and, where not otherwise specified, use nontoxic materials that will not damage surfaces.
 - 1. Contractor shall remove debris from concealed spaces before enclosing space.
 - 2. Contractor shall supervise construction operations to assure no part of construction, completed or in progress, is subject to harmful, dangerous, or otherwise undesirable exposure during the construction period.
- C. Final Cleaning: Contractor shall perform final cleaning when the Project is substantially complete.
 - 1. Contractor shall clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, hand prints and scuff marks; polish transparent and glossy surfaces; wash and buff all resilient floors to a high finish using manufacturer-recommended wax; and vacuum and steam clean any stains from carpeted and soft surfaces.
 - 2. Contractor shall clean equipment and fixtures to a sanitary condition.

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- 3. Contractor shall clean the site, sweep all areas, and remove waste, surplus materials and rubbish from Project area.

 - D. Deficient cleaning shall be corrected as directed by the Engineer upon inspection.
- 3.03 PROTECTION. Contractor shall:
- A. Protect products subject to deterioration with impervious cover, and provide ventilation to avoid condensation and trapping of water.

 - B. Take care to use protective covering and blocking materials that do not soil, stain, or damage materials being protected; protect interior from water damage and take measures to prevent growth of mold and mildew on the Work.

 - C. Provide coverings to protect products and facilities from damage from construction operations, and remove coverings when no longer needed.

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SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. Contractor shall be responsible for cutting, fitting and patching required to complete Work and to:
 - 1. Make parts fit together properly.
 - 2. Uncover Work to provide for installation of ill-timed or out-of-sequence Work.
 - 3. Remove and replace defective Work.
 - 4. Remove and replace Work not conforming to Contract Documents.
 - 5. Remove samples of installed Work as required for testing.
 - 6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

- B. Related Requirements: Section 01 53 00, Temporary Construction.

1.02 SUBMITTALS

- A. Submit a written request to the Engineer well in advance of executing cutting or alteration which affects:
 - 1. Work of City or separate contractor;
 - 2. Structural value or integrity of any element of Project;
 - 3. Integrity of weather-exposed or moisture-resistant elements;
 - 4. Efficiency, operational life, maintenance or safety of operational elements;
 - 5. Visual qualities of sight-exposed elements.

- B. Such request shall include:
 - 1. Identification of the Project and description of affected Work;
 - 2. Necessity for cutting or alteration;
 - 3. Effect on the project as specified in Paragraph A above;
 - 4. Alternatives to cutting and patching;
 - 5. Cost proposal, when applicable;
 - 6. Written permission of separate contractor whose Work will be affected;
 - 7. Description of proposed Work including:
 - a. Scope of cutting, patching, alteration, or excavation,
 - b. Time and duration of Work,
 - c. Products proposed to be used and extent of refinishing to be included.

1.03 MATERIALS

- A. Materials shall comply with Specifications and standards for each specific product involved. Where Specifications and standards have not been provided, Contractor shall provide materials and fabrication consistent with the quality of the Work and intended for commercial construction.

- B. Contractor shall provide new materials for cutting and patching unless otherwise indicated.

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1.04 EXAMINATION

- A. Contractor shall examine existing conditions of the Project, including elements subject to damage or to movement during cutting and patching. After uncovering the Work, Contractor shall examine conditions affecting the installation of products, or performance of the Work.

1.05 PREPARATION

- A. Contractor shall protect other portions of the Project from damage.
- B. Contractor shall provide adequate temporary support as necessary to assure the structural integrity of the affected portion of Work. Contractor shall provide services of a licensed Structural Engineer for designing temporary support where required by applicable authorities for temporary supports and for shoring. Engineering calculations shall be submitted for review by the Engineer prior to starting Work.

1.06 PERFORMANCE

- A. Contractor shall employ methods that provide proper surfaces to receive installation of repairs and finishes. Excavating and backfilling shall be by methods which will prevent settlement, and damage to other Work.
- B. Contractor shall fit and adjust products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- C. Contractor shall restore Work that has been cut or removed.
- D. Work shall fit tightly to pipes, sleeves, ducts, conduit and penetrations through surfaces.
- E. Contractor shall refinish entire surfaces as necessary to provide even finish to match adjacent finishes.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

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SECTION 01 77 10

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section describes contract closeout procedures including:
 - 1. Removal of temporary construction facilities
 - 2. Substantial completion
 - 3. Final completion
 - 4. Inspection Coordination
 - 5. Warranties
 - 6. Final Acceptance
 - 7. Liquidated Damages

1.02 REMOVAL OF TEMPORARY CONSTRUCTION FACILITIES

- A. Contractor shall remove temporary materials, equipment, services, and construction prior to inspection for substantial completion, and repair damages caused by installation or use of temporary facilities. Contractor shall clean and restore subject areas to pre-existing conditions or better, or to a condition as shown on the project plans or documented by the Engineer.

1.03 SUBSTANTIAL COMPLETION

- A. When Contractor considers the project to be substantially complete, Contractor shall submit written notice to City, with list of items remaining to be completed or corrected. The term "Substantial Completion" is defined in Section 01 42 10, "References and Definitions". Substantial Completion does not stop the tolling of contract time, does not constitute acceptance of work, and does not prevent the enforcement of liquidated damages.
- B. Within a reasonable time, City will inspect to confirm status of substantial completion. Should City determine that Work is not substantially complete, City will promptly notify Contractor in writing, listing all defects and omissions.
- C. Contractor shall remedy deficiencies and send a second written notice of substantial completion to the City. Upon receipt of proper notice, the City will re-inspect the Work. If deficiencies previously noted are not corrected on reinspection, then Contractor shall again be notified of defects and omissions. Contractor shall pay the cost of the reinspection and any subsequent reinspections.
- D. Manufactured units, equipment and systems that require startup must have been started up and run for periods prescribed by the manufacturers and/or the City, all associated training completed and all spare parts and O & M manuals turned over to the City before a Certificate of Substantial Completion will be issued.
- E. When City concurs that Work is substantially complete, City will issue a Certificate of Substantial Completion, accompanied by a final punch list of items remaining to be completed or corrected. One follow-up review of punch list items for each discipline will be provided. If further site visits are required to review punch list items due to incompleteness of

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the work by Contractor, costs incurred by these visits shall be withheld from any payment due to the Contractor.

- F. Upon determination of Substantial Completion by City and issuance of the final punch list, Contractor has ten (10) working days to complete the items. Failure to commence this Work or to complete the Work within the allotted time without supplying an adequate Work force and making a diligent effort and continued progress shall constitute a material breach of contract and sufficient ground for City to terminate the Contractor's control as specified in Specifications 00 72 00, Part 13.G.1.b, and to exercise its rights under Part 10.E.2.

1.04 FINAL COMPLETION

- A. Final Completion is defined in Section 01 42 10, "References and Definitions". Final Completion occurs when Work meets requirements for City's Final Acceptance. When Contractor considers Work is finally complete, he/she shall submit written certification that:
 - 1. Contractor has inspected the Work for compliance with the Contract Documents, and all requirements for Final Acceptance have been met.
 - 2. Except for Contractor maintenance after Final Acceptance, the Work has been completed in accordance with the Contract Documents and all deficiencies identified to date have been corrected.
 - 3. All Punchlist items are complete and ready for final inspection.
- B. Should City determine that Work is incomplete or defective:
 - 1. City promptly will so notify the Contractor, in writing, listing the incomplete or defective items.
 - 2. The Contractor shall promptly remedy the deficiencies and notify the City when it is ready for re-inspection. The Contractor shall be responsible for costs incurred by City for reinspection visits.
- C. Final Adjustments of Accounts
 - 1. Contractor shall submit a final statement of accounting to City, showing all adjustments to the Contract Sum and complete and execute Document 00 65 10 Agreement and Release of Any and All Claims.
 - 2. If so required, City shall prepare a final Change Order for submittal to Contractor, showing adjustments to the Contract Sum that were not previously made.

1.05 INSPECTION COORDINATION

- A. Contractor is responsible for arranging all progress and final inspections by permit agencies as required to obtain a certificate of occupancy for the project prior to Final Acceptance by the City.
- B. Contractor shall coordinate inspections with sufficient notice to permit convenient scheduling of City participation in the inspections.

1.06 WARRANTIES

- A. Contractor shall assemble warranty documents, and operations and maintenance manuals, including those executed or supplied by subcontractors, suppliers, and manufacturers. Documents shall be organized by a table of contents, in the order of the specification sections, and assembled in 8-1/2 inches by 11 inches three-ring binders with durable plastic covers.

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- B. Contractor shall submit material with the notification of final completion to the City.
- C. Warranties are intended to protect City against failure of the Work and against deficient, defective and faulty materials and workmanship, regardless of sources. The warranty period begins upon the final acceptance of the project by the City Council, regardless of the time when the subject equipment or product is put into use.
- D. Contractor shall remove and replace Work which is damaged as result of defective Work, or which must be removed and replaced to provide access for correction of warranted Work. After correction of warranted Work, reinstate warranty for corrected Work to a date not less than one year after final acceptance of project by City, or one year after corrected Work was done, whichever is later.
- E. Contractor shall replace or restore failing warranted items without regard to anticipated useful service lives.
- F. Warranty of Title: No material, supplies, or equipment for Work under Contract shall be purchased subject to any chattel mortgage, security agreement, or under a conditional sale or other agreement by which an interest therein or any part thereof is retained by seller or supplier. Contractor warrants good title to all material, supplies, and equipment installed or incorporated in the Work and agrees upon completion of all Work to deliver premises, together with improvements and appurtenances constructed or placed thereon by Contractor, to City free from any claim, liens, security interest, or charges, and further agrees that neither Contractor nor any person, firm, or corporation furnishing any materials or labor for any Work covered by Contract shall have right to lien upon premises or improvement or appurtenances thereon. Nothing contained in this Paragraph, however, shall defeat or impair right of persons furnishing materials or labor under bond given by Contractor for their protection or any rights under law permitting persons to look to funds due Contractor in hands of City.

1.07 FINAL ACCEPTANCE

- A. Final acceptance does not occur until the day after the City of Lafayette City Council formally takes action to accept the project as complete and authorize City staff to record a Notice of Completion.
- B. All guaranty and warranty periods specified in these Specifications do not begin until Final Acceptance has occurred, unless otherwise specifically agreed to in writing by the Engineer.
- C. Under normal circumstances, retention of contract payments, less the warranty retention, will be released within sixty (60) days of final acceptance and recordation of a Notice of Completion.

1.08 LIQUIDATED DAMAGES

- A. If assessment of Liquidated damages as provided by Contract Documents occurs during the Project, such assessment shall continue until the day Contractor achieves final completion and all Work is ready for final acceptance as defined in these Specifications.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

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SECTION 02 41 19.13

SELECTIVE BUILDING DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Removal of designated building equipment and fixtures.
 - 2. Removal of designated construction.
 - 3. Removed materials shall be taken offsite and disposed in accordance with Section 01 74 19.

- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

- C. Related Sections
 - 1. Section 01 73 29 - Cutting and Patching: For cutting and patching.
 - 2. Section 01 74 19 - Construction Waste Management and Disposal: For construction waste management and disposal requirements.

1.02 REFERENCES

- A. ANSI - American National Standards Institute

- B. ASSE - American Society of Safety Engineers
 - 1. A10.6 - Safety and Health Program Requirements for Demolition Operations.

- C. NFPA - National Fire Protection Association
 - 1. 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.03 DEFINITIONS

- A. Demo: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

- B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to the Owner's designated storage area.

- C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

- E. Materials Ownership: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials

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shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

1.04 SUBMITTALS

- A. Schedule of selective demolition activities indicating the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
 - 2. Interruption of utility services and security devices. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services and security devices.
 - 4. Locations of temporary partitions, air locks, and means of egress.
 - 5. Use of stairs.

- B. Proposed Protection Measures: Submit report, including drawings that indicate the measures proposed for protecting individuals and property, for environmental protection, for dust control, for noise control, and for existing historic elements. Indicate proposed locations and construction of barriers.

1.05 QUALITY ASSURANCE

- A. Qualifications: Work shall be performed by qualified selective demolition firm with not less than 5 years' successful experience in comparable selective demolition projects, and employing personnel skilled in removal and reinstallation processes and operations indicated.
 - 1. The Contractor shall provide a list of 3 similar projects completed within the last 5 years.
 - 2. Submit record of the experience for each superintendent and skilled craftsman proposed for the project.
 - 3. Work is to be done by first-class workmen experienced in the best and accepted methods of selected demolition.

- B. Regulatory Requirements
 - 1. Conform to applicable code for demolition work, safety of structure, and dust control.
 - 2. Obtain required permits from authorities.
 - 3. Notify affected utility companies and the Owner before starting Work and comply with their requirements.
 - 4. Do not close or obstruct egress width to exits.
 - 5. Do not disable or disrupt building fire or life safety systems without 3 day prior written notice to the Owner.
 - 6. Conform to procedures applicable when discovering hazardous or contaminated materials.
 - 7. Comply with hauling and disposal regulations of authorities having jurisdiction.
 - 8. Comply with governing EPA notification regulations before beginning selective demolition.
 - 9. Comply with ANSI/ASSE A10.6 and NFPA 241.

- C. Pre-Installation Meetings
 - 1. Pre-Demolition Conference: Conduct conference at the Project site.
 - a. Inspect and discuss condition of construction to be selectively demolished.
 - b. Review structural load limitations of existing structure.

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- c. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - d. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - e. Review areas where existing construction is to remain and requires protection.
- D. Project Record Documents
- 1. Accurately record actual locations of capped utilities and subsurface obstructions.
 - 2. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with the Owner's Representative prior to start of work.

1.06 PROJECT CONDITIONS

- A. Condition of Structures: The Owner assumes no responsibility for actual condition of items or structures to be demolished.
- 1. Conditions existing at time of inspection for bidding purposes will be maintained by the Owner insofar as practicable. However, minor variations within structure may occur by the Owner's removal and salvage operations prior to start of selective demolition work.
- B. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to the Owner are to be removed from structure as work progresses. Transport salvaged items from site as they are removed, and deliver to the Owner's storage area. Storage or sale of removed items on site will not be permitted.
- C. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
- D. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- E. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations. Maintain adequate ventilation when using flame cutting operations.
- F. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
- 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized by the Owner. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities. Provide not less than 72 hours' notice to the Owner if shutdown of service is required during changeover.
 - 2. Maintain fire protection services during selective demolition operations.
 - 3. Verify that utilities have been disconnected and capped.
 - 4. Review record documents of existing construction provided by the Owner. The Owner does not guarantee that existing conditions are the same as those indicated in record documents.

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5. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
 6. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
 7. When unanticipated plumbing, mechanical, electrical, security, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.
 8. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure during selective demolition.
 9. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
 10. Record existing conditions by use of preconstruction photographic documentation.
- G. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with government regulations pertaining to environmental protection.
1. Do not use water when it may create hazardous or objectionable conditions such as flooding, and pollution.
- H. See Hazardous Materials report prepared by the Owner for hazardous materials that are likely to be encountered on site. Follow procedures where hazardous materials are encountered.
- I. Notify the Architect of discrepancies between existing conditions and the Drawings before proceeding with selective demolition.
- J. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.

1.07 SEQUENCING

- A. Sequence work under the provisions of Section 01 11 00.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION

3.01 PREPARATION

- A. General: Provide shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
1. Cease operations and notify the Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
 2. Cover and protect furniture, equipment, and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed.
 3. Provide weatherproof closures for exterior openings resulting from demolition work. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
 4. Erect and maintain temporary partitions to prevent spread of dust, odors and noise to permit continued Owner occupancy, as specified in Section 01 11 00.

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5. Protect existing materials and equipment which are not to be demolished.

3.02 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Cease operations immediately if structure appears to be in danger. Notify the Owner and Architect. Do not resume operations until directed.
- C. Maintain protected egress and access to the Work.

3.03 DEMOLITION

- A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on the Drawings in accordance with demolition schedule, governing regulations and following requirements.
 1. Demolish concrete and masonry in small sections.
- B. Concrete Slabs
 1. Where existing reinforcing is to be removed: cut concrete at junctures with construction to remain using power-driven concrete saw or hand tools. Do not use power-driven impact tools.
 2. Where existing reinforcing is to remain: score top and bottom surfaces of concrete at junctures with construction to remain using concrete saw, but do not cut existing reinforcing. Remove concrete with hand-held power-driven light impact tools or hand tools. Do not spall concrete beyond edge of score line.
- C. Concrete Walls
 1. Walls and portions of walls to be removed: cut concrete at junctures with construction to remain using power-driven concrete saw or hand tools. Do not use power-driven impact tools.
 2. Walls and columns to be roughened: Use hand-held power-driven light impact tools, such as "bush hammers". Surface shall conform to requirements of Section 03 30 00.
- D. General Procedures
 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition work above each floor or tier before disturbing supporting members on lower levels.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Maintain adequate ventilation when using cutting torches.
 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 6. Remove structural framing members and lower to ground by method suitable to avoid free-fall and to prevent ground impact or dust generation.
 7. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

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8. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.

- E. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from the Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

- F. Utility Requirements
 1. Locate, identify, disconnect, and seal or cap off indicated utility services serving portions of the buildings to be selectively demolished.
 2. Arrange to shut off indicated utilities with utility companies.
 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/system that bypass area of selective demolition and that maintain continuity of services/systems to other parts of the building.
 4. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.04 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off-site.
 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
 2. Burning of removed materials is not permitted on the Project site.
 3. Remove debris from elevated portions of building by chute, hoist or other devise that will convey debris to grade level.

3.05 CLEANUP AND REPAIR

- A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.
 1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations.

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Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

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SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Section Includes: Provision of reinforcement for all concrete unless specifically noted otherwise.
- B. Related Sections:
 - 1. Section 03 30 00 – Cast-in-Place Concrete

1.02 REFERENCES

- A. Requirements of the GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
 - 1. California Building Code (CBC), 2019 Edition.
 - 2. American Society for Testing and Materials (ASTM).
 - 3. American Concrete Institute's
 - a. "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (ACI 315).
 - b. "Building Code Requirements for Reinforced Concrete" (ACI 318).
 - 4. Concrete Reinforcing Steel Institute (CRSI) and/or Western Concrete Reinforcing Steel Institute (WCRSI).
 - a. "Manual of Standard Practice."
 - b. "Recommended Practice for Placing Reinforcing Bars."
 - 2. American Welding Society's
 - a. "Mild Steel Covered Arc-Welding Electrodes" (AWS A5.1).
 - b. "Reinforcing Steel Welding Code: (AWS D1.4).

1.03 QUALITY ASSURANCE

- A. Welders' Qualifications: Welders shall be qualified in accordance with AWS D1.4.
- B. Reinforcing steel shall not be permitted to rust where there is danger of staining exposed surfaces of adjacent concrete. The Contractor shall replace rust stained concrete at his expense.
- C. Allowable Tolerances: Reinforcing steel shall be placed within tolerances permitted by ACI 318, Section 7.5.2 unless otherwise approved by the Architect.
- D. The Owner's Testing Agency will provide tests in accordance with CBC section 1916:
 - 1. Collect mill test reports for reinforcement.
 - 2. Provide inspection of welding, including prior fit-up, welding equipment, weld quality and welder certification in accordance with AWS D1.4 and UBC Standard No. 19-1. Chemical analysis sufficient to determine carbon equivalent and minimum preheat temperature shall be performed when reinforcement does not conform to low-alloy steel requirements of ASTM A706.

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1.04 SUBMITTALS

- A. Shop Drawings: Show bending and placing details, size and location of reinforcing steel. Include diagrammatic wall elevations at 1/4-inch equals one foot scale to clearly show position and erection marks of bars including marginal bars around openings with dowels, splices, etc.
- B. Mill Test reports for each heat or melt of steel.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcement and accessories to site not more than 48 hours before placement.
- B. Store in manner to prevent excessive rusting and fouling with grease, dirt, or other bond-weakening coatings.
- C. Take precautions to maintain identification after bundles are broken.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Bars: New billet steel, ASTM A615 Grade 60; ASTM A706 for welded bars.
- B. Tie Wires and Spirals: ASTM A82.
- C. Welded Wire Fabric: ASTM A185.
- D. Welding Electrodes: Mild steel covered arc-welding types conforming to AWS A5.1.
- E. Bar Supports: As required for assembling and supporting reinforcement in place.
 - 1. CRSI Class 3: Where bar supports do not come in contact with exposed concrete surfaces.
 - 2. CRSI Class 1 plastic-protected; or Class 2 stainless steel wire: Interior and Exterior Soffits and Other Exposed Conditions.
 - 3. Precast Concrete Wired Block: At slabs-on-grade and as necessary at other locations.
- F. Threaded coupler: Lenton Standard coupler by ERICO or equal product substituted per Section 01630. Couplers may be type 1 except where otherwise noted:
 - 1. Type 1 couplers shall develop 125 percent of specified yield strength of reinforcement.
 - 2. Type 2 couplers shall develop 160 percent of specified yield strength of reinforcement.
- G. Welded Deformed Bar Anchors: ASTM A-108 $f_y = 70,000$ psi, flux filled deformed bar anchors. Same as Nelson D2L or equal product substituted per Section 01630.

2.02 FABRICATION

- A. Shop-fabricate to comply with drawings.
- B. Conform with requirements of ACI 315 where specific details are not shown or where drawings and specifications are not more demanding.

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PART 3 – EXECUTION

3.01 PLACEMENT

- A. General:
1. Contractor shall coordinate the placement of the reinforcing indicated on the drawings to avoid interference while maintaining minimum cover requirements.
 2. All reinforcement shall be continuous. See drawings for lap splice schedule. Stagger splices where possible. Contact lap splices shall be securely wired together to maintain alignment.
 3. Ensure placement will permit concrete protection in conformance with CRSI or to extent shown.
 4. Support and fasten bars securely with spacers, chairs or ties to permit their being walked upon without displacement or movement both before and during placement of concrete. Wire-tie bar intersections.
 5. Do not bend bars around openings or sleeves. Wherever conduits, piping, inserts, sleeves, etc. interfere with placing of reinforcement, obtain the Architect's approval of placing before concreting.
 6. Do not field bend bars unless expressly noted in the Contract Documents.
- B. Welding:
1. Employ shielded metal-arc method and conform to AWS D1.4.
 2. Ensure equipment supplies proper current and voltage and is adjustable to suit arrangement and thickness of items welded.
- C. Prior to placing concrete, verify reinforcement has been bent, positioned, and secured in accordance with drawings; ensure removal of oil, grease, dirt, or other bond-weakening coatings; replace severely rust-pitted reinforcing bars.
- D. Quality Assurance:
1. The Owner's Testing Agency will inspect placement of reinforcement and mechanical splices and notify Architect of any discrepancies in placement
 2. The Owner's Testing Agency will inspect shop and field welding per CBC 1704.

END OF SECTION

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Section Includes: Provision of cast-in-place concrete unless specifically noted otherwise.
- B. Related Sections:
 - 1. Section 03 20 00 – Concrete Reinforcement

1.02 REFERENCES

- A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
 - 1. California Code of Regulations. Title 24, 2019 edition, also known as California Building Code (CBC).
 - 2. American Society for Testing and Materials (ASTM).
 - 3. American Concrete Institute's:
 - a. "Standard Specifications for Tolerances for Concrete Construction and Materials" (ACI 117).
 - b. "Specification for Structural Concrete for Buildings" (ACI 301).
 - c. "Recommended Practice for Measuring, Mixing and Placing Concrete" (ACI 304).
 - d. "Recommended Practice for Hot Weather Concreting" (ACI 305).
 - e. "Recommended Practice for Cold Weather Concreting" (ACI 306).
 - f. "Building Code Requirements for Reinforced Concrete" (ACI 318).

1.02 QUALITY ASSURANCE

- A. The Contractor's Testing Laboratory Qualifications: The Contractor's Testing Laboratory shall be under direction of a Civil Engineer registered in the State of California, shall have operated successfully for four years prior to this work, and shall conform to requirements of ASTM E329.
- B. Requirements of ACI 301 shall govern work, materials and equipment related to this Section; specifications herein set minimum results required, and references to procedures are intended to establish minimal guides.
- C. The Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete meets minimum requirements. Tolerances shall meet the requirements of ACI 117 except as modified in the Construction Documents.
- D. Placing of concrete by means of pumping will be an acceptable method of placement providing that the Contractor can demonstrate that:
 - 1. Specified concrete strengths will be met.
 - 2. Equipment has a record of satisfactory performance under similar conditions and using a similar mix.
 - 3. Trial batches have been made.

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1.03 SUBMITTALS

- A. The Contractor shall submit:
 - 1. Certified copies of mix designs for each concrete class specified including compressive strength test reports.
 - 2. Certification that materials meet the requirements specified.
 - 3. Samples only as requested by the Architect.
 - 4. Certification from vendor that samples originate from and are representative of each lot proposed for use.
- B. The Owner's Testing Agency will submit reports on tests and inspections performed to the Owner, the Architect, the Contractor, and the City Building Department.
- C. Shop Drawings: Show construction and expansion and contraction joint locations and details.
- D. Schedule of placing for the Architect's review before starting work.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Ensure storage facilities are weather tight and dry.
- B. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.
- C. Store bulk cement in bins capable of preventing exposure to moisture.
- D. Use sacked cement in chronological order of delivery. Store each shipment so that it may be readily distinguishable from other shipments.

PART 2 - PRODUCTS

2.01 CONCRETE

- A. Table 2-1: Concrete Properties

Class	Use	Unit Weight (PCF)	28 Day Strength (PSI)	Slump	Max Aggregate Size	Water / Cement Ratio
A	Slab-On-Grade	145	4000	3 1/2" ± 1/2"	1"	0.40

- B. Strength refers to the compressive strength in psi after 28-days when tested in accordance with ASTM C39. All concrete shall develop compression strength specified in 28-days. To meet above requirements, mix shall be designed such that average compressive strength will exceed specified 28-day strength by an amount as specified by ACI 318.
- C. Aggregate size refers to the maximum size in inches.

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- D. Slump is measured in inches and tested in accordance with ASTM C143.
- E. Water/Cement Ratio is the maximum ratio of water to cementitious material by weight.

2.02 MATERIALS

- A. General Requirements:
 - 1. Cement and aggregates shall have proven history of successful use with one another. Sources of cement and aggregate shall remain unchanged throughout work unless the Architect approves request for change made at least 10-days prior to anticipated date of casting.
 - 2. Ready-mixed concrete shall meet requirements of ASTM C94.
 - 3. Deviations in properties of materials tested by the Owner's Testing Agency shall be cause for their rejection pending additional test results and redesign of mix by the Contractor's Testing Laboratory.
 - 4. No frozen aggregates will be permitted.
- B. Cements: ASTM C150, Type II. Use one brand of cement throughout project unless otherwise directed by the Architect. C. Fly Ash: ASTM C618, Type F.
- C. Water: Clean and potable, free from impurities detrimental to concrete.
- D. Admixtures:
 - 1. Water-Reducing Admixture: ASTM C494, Type A, non-lignini sulfonate. Same as Grace Construction Materials' "WRDA with Hycol"; Master Builders "Pozzolith 322N"; Sika Corp.'s "Plastocrete 161"; or equal product substituted per Section 01630.
 - 2. Air Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other products. Same as W.R. Grace's "Daravair," Master Builders' "Micro-Air," Sika Corp.'s "Sika Aer," or equal product substituted per Section 01630.[Note to specifier: Improves durability, particularly freeze-thaw cycles and somewhat for saltwater exposure.]
 - 3. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C494, Type F or Type G. Same as W.R. Grace's "Daracem 19," Master Builders' "Rheobuild," Sika Corp.'s "Sikament," or equal product substituted per Section 01630.
 - 4. Water Reducing, Accelerator Admixture: ASTM C494, Type E. Same as W.R. Grace's "Daracel," Master Builder's "Pozzutec 20," Sika's "Sikaset NC," or equal product substituted per Section 01630.
 - 5. Water Reducing, Retarding Admixture: ASTM C494, Type D. Same as W.R. Grace's "Daratard-17," Master Builders' "Pozzoliith R," Sika's "Plastiment," or equal product substituted per Section 01630.
 - 6. Other Admixtures: Only as approved by the Architect.
- E. Wax Sealer: Heavy penetrating type as manufactured by approved manufacturer of clear hardener.
- F. Abrasive Grains: Aluminum oxide type. Same as Sonneborn-Contech's "Frictex NS"; General Abrasive Co., Inc.'s "Fut-Sure"; The Exolon Co.'s "Exolon AntiSlip"; or equal product substituted per Section 01630.
- G. Non-Shrink Grout: Premixed high strength grout requiring only addition of water at the site. Same as Master Builder's "Masterflow 928 Grout"; Burke's "NonFerrous, Non-Shrink Grout," or equal product substituted per Section 01630. K. Curing Materials:

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1. Waterproof Paper: ASTM C171, Type 1, regular. Same as Sisalkraft Division of St. Regis Paper Co.'s "Orange Label"; or equal product substituted per Section 01630.
 2. Sheet Plastic: Polyethylene, four mils thick, fungus-resistant.
 3. Curing Compound: ASTM C309. Same as Curecrete Chemical Company's "Ashford Formula"; Master Builders' "Masterkure N-Seal-W," or equal product substituted per Section 01630.
- L. Concrete Sealer: Clear water repellent treatment, blend of six resins containing no silicones or stearates, no darkening or change of color. Same as SonnebornContech's "White Rox M-6-50-8"; Tamms Industries' "Chemstop" or equal product substituted per Section 01630.
- M. Hardener, Clear Liquid Type: Grace construction Materials' "Hornstone Crystal Chemical Hardener"; Master Builder's "Mastercron"; Sonneborn-Contech's "Lapidolith"; Upco Co.'s "Vitrox 4701"; or equal product substituted per Section 01630.
- N. Epoxy Adhesive: Two component material suitable for anchoring rebar into dry or damp concrete. Same as Simpson Strong Tie's "SET-XP", Hilti's "HIT RE500SD", or equal product substituted per Section 01630. See masonry section for adhesives allowed into masonry construction.
- O. Fibrous Reinforcement: ASTM C1116, Type 3, collated, fillibrated $\frac{3}{4}$ " (20mm) polypropylene fibers designed for secondary reinforcement of concrete slabs. Same as W.R. Grace's "Grace Fibers," Euclids "Fiberstrand 100" or Fibermesh's "Fibermesh." Add 1 $\frac{1}{2}$ lbs. of fibers per cubic yard of concrete. Use in strict accordance with fiber supplier's recommendation.
- P. Sleeves through concrete: ASTM A53 pipe galvanized per ASTM A153.

2.03 MIXES

- A. General Requirements:
1. The Contractor shall perform tests or assemble the necessary data indicating conformance with specifications.
 2. For each mix submit data showing that proposed mix will attain the required strength in accordance with requirements of CBC Section 1905.3, "Proportioning on the basis of field experience or trial mixtures". If sufficient test results for "Proportioning on the basis of field experience or trial mixtures, or both," CBC Section 1905.3 are not available, the contractor shall proportion concrete mixes in accordance with requirements of CBC Section 1905.4, "Proportioning without field experience or trial mixtures".
 3. The Contractor shall instruct Laboratory to base mix design on use of materials tested and approved by the Owner's Testing Agency. Mix design shall include compression strength test reports per CBC Section 1905.3, 1905.4, or CBC Section 1905.6. Mix shall be designed, tested, and adjusted if necessary in ample time before first concrete is scheduled to be placed. Laboratory data and strength test results for revised mix design shall be submitted to Architect prior to using in project.
 4. Ensure mix designs will produce concrete to strengths specified and of uniform density without segregation.
 5. If mix yield exceeds 1-cubic yard, modify mix design to no more than one cubic yard without changing cement content.
 6. The Contractor's mix designs shall be subject to review by the Architect and by the Owner's Testing Agency.
 7. Introduction of calcium chloride will not be permitted.

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8. Unspecified admixtures will not be permitted unless the Architect reviews, the Contractor modifies mix designs as necessary, and modifications are accepted by the Owner's Testing Agency.
- B. Slab-on-Grade Mix requirements: Use of Water-Reducing admixture is required. High Range Water-Reducing admixture (super plasticizer) shall be used when required to maintain workability and pumpability.
- C. Patching Mortar: Mix in proportions by volume of one part cement to two parts fine sand.
- D. Concrete Fill at Stairs: Mix in proportions by volume of one part cement, two parts fine aggregate, one part coarse aggregate (3/8- inch); with as little water as necessary to make stiff workable plastic mix.
- E. Non-Shrink Grout: Follow approved manufacturer's printed instructions and recommendations.

2.04 MIXING

- A. Batching Plant Conditions:
 1. Batch plant shall be certified to comply with the requirements of the National Concrete Ready Mix Association.
 2. Ensure equipment and plant will afford accurate weighing, minimize segregation and will efficiently handle all materials to satisfaction of the Architect and the Owner's Testing Agency.
 3. Replace at no additional expense equipment the Architect and the Owner's Testing Agency deem inadequate or unsuitable.
 4. Use approved moisture meter capable of determining moisture content of sand.
- B. General Requirements:
 1. Thoroughly clean concrete equipment before use for architectural concrete mixes to avoid contamination.
 2. Mix cement, fine and coarse aggregates, admixtures and water to exact proportions of mix designs.
 3. Measure fine and coarse aggregates separately according to approved method that provides accurate control and easy checking.
 4. Adjust grading to improve workability; do not add water unless otherwise directed.
 5. Maintain proportions, values, or factors of approved mixes throughout work.
 6. Mix concrete in transit mixers five minutes immediately prior to discharge in addition to mixing as called for by ACI 304 and ASTM C94.
- C. Admixtures: Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.

2.05 SOURCE QUALITY CONTROL

- A. The Owner's Testing Agency will provide structural tests and inspections in accordance with CBC 1704 and as follows:
 1. Review mix designs, certificates of compliance, and samples of materials the Contractor proposes to use.
 2. Test and inspect materials, as necessary, in accordance with ACI 318.
 3. Take samples as required from the Contractor's designated sources.

PART 3 - EXECUTION

3.01 EXAMINATION

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- A. Examine units of work to be cast and verify that:
 - 1. Construction of formwork is complete.
 - 2. Required reinforcement, inserts, and embedded items are in place.
 - 3. Form ties at construction joints are tight.
 - 4. Concrete-receiving places are free of debris.
 - 5. Dampen subgrade or sand course for slabs-on-grade. Do not saturate.
 - 6. Depths of depressed slab conditions are correct for delayed finish noted and for its proper bonding to concrete.
 - 7. Conveying equipment is clean and properly operating.
 - 8. The Architect has reviewed formwork and reinforcing steel and that preparations have been checked with the Project Inspector.
- B. Do not begin casting before unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Ensure availability of sufficient labor, equipment and materials to place concrete correctly in accordance with scheduled casting.
- B. Protect finished surfaces adjacent to concrete-receiving places.
- C. Clean transportation and handling equipment at frequent intervals and flush thoroughly with water before each day's run. Do not discharge wash water into concrete form.

3.03 PLACING

- A. The Inspector of Record, Architect, Structural Engineer, and Testing Laboratory shall be notified at least 48 hours before placing concrete.
- B. Place concrete in accordance with CBC Section 1905.
- C. Place concrete in cycles as a continuous operation to permit proper and thorough integration and to complete scheduled placement. Place no concrete where sun, wind, heat, or facilities prevent proper finishing and curing.
- D. Convey concrete as rapidly and directly as practicable to preserve quality and to prevent separation from rehandling and flowing; do not deposit concrete initially set. Complete placement of concrete within ninety (90) minutes after adding water unless otherwise noted. Retempering of concrete which has partially set will not be permitted.
- E. Take precautions to avoid damage to under-slab moisture barrier and displacement of reinforcement and formwork.
- F. Deposit concrete vertically in its final position. Avoid free falls in excess of six feet where reinforcement will cause segregation and in typical conditions unless the Architect approves otherwise.
- G. Keep forms and reinforcement clean above pour line by removing clinging concrete with wire brush before casting next lift. Also remove leakage through forms.
- H. Interruption in casting longer than 60-minutes shall be cause for discontinuing casting for remainder of day. In this event, cut back concrete and provide

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construction joints as the Architect directs; clean forms and reinforcement as necessary to receive concrete at a later time.

- I. Hot Weather Concreting: Conform to ACI 305 and following requirements when mean daily temperature rises above 75 degrees Fahrenheit.
 - 1. An upper temperature limit of concrete mixes shall be established by the Contractor for each class of concrete. Concrete temperature during placing shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints, and shall not exceed 90°F. Other project climatic conditions detrimental to concrete quality such as relative humidity, wind velocity, and solar radiation shall also be considered.
 - 2. Trial batches of concrete for each mix design shall be made at the limiting mix temperature selected. In lieu of trial batches, compression strength test reports (20 minimum) at the limiting temperature for each proposed mix shall be submitted to the Owner's testing laboratory for review.
 - 3. Practices to maintain concrete below maximum limiting temperature shall be in accordance with ACI 305. Concrete ingredients may be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for part of the mixing water.
 - 4. Practices to avoid the potential problems of hot weather concreting shall be employed by the Contractor in accordance with ACI 305.
 - 5. When the temperature of the reinforcing steel or steel deck forms is greater than 120°F, reinforcing and forms shall be sprayed with water just prior to placing the concrete.

- J. Cold Weather Concreting:
 - 1. No placement of concrete will be allowed at temperatures below 20 degrees Fahrenheit or if mean daily temperature for curing period is anticipated to be below 20 degrees Fahrenheit.

- K. No concrete placement will be allowed on frozen subgrade.

- L. Conform to ACI 306 and following requirements when mean daily temperature falls below 40 degrees Fahrenheit.
 - 1. Reinforcement, forms or ground to receive concrete shall be completely free from frost.
 - 2. Concrete at time of placement for footings shall have temperature no lower than 50 degrees Fahrenheit, for all other concrete this minimum temperature at time of placement shall be 60 degrees Fahrenheit. Maximum temperature shall be 90 degrees Fahrenheit.
 - 3. Concrete shall be maintained at temperature no lower than 50 degrees Fahrenheit for minimum 7-day period after placement by means of blanket insulation, heaters, or other methods as approved by the Architect.
 - 4. Use of calcium chloride or admixtures containing calcium chloride as accelerators will not be permitted.
 - 5. The Contractor shall keep a record of concrete surface temperature for first 7-days after each pour. This record shall be open to inspection by the Architect.

- M. For adhesive installations into concrete; the temperature of the concrete shall be maintained above the lowest temperature allowed by the manufacturer during the entire curing process.

- N. Consolidating:
 - 1. Use vibrators for thorough consolidation of concrete (including, but not limited to, mat slabs and structural slabs).

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2. Provide vibrators for each location during simultaneous placing to ensure timely consolidation around reinforcement, embedded items and into corners of forms; ensure availability of spare vibrators in case of failures. Vibrate through full depth of freshly placed concrete.
 3. Do not place vibrators against reinforcement, attach to forms, or use to spread concrete.
 4. Exposed Concrete: Vibrate with rubber type heads and, in addition, spade along forms with flat strap or plate.
- O. Construction Joints:
1. Verify location and conformance with typical details; provide only where designated or approved by the Architect. Comply with CBC Section 1906.4. Construction joints require keys and additional reinforcement unless otherwise noted; consult architect for details.
 2. All horizontal and vertical construction joints to be thoroughly sandblasted to clean and roughen entire surface to minimum 1/4-inch relief exposing clean coarse aggregate solidly embedded in mortar matrix.
 3. Just prior to depositing concrete, the surface of the construction joint shall be thoroughly wetted.
- P. Contraction (Control) Joints in Slabs-on-Grade:
1. Construct contraction joints in slabs-on-ground to form panels of patterns indicated on Shop Drawings. Use saw cuts 1/8" x 1/4 slab depth, unless otherwise indicated.
 2. Time saw cutting to allow sufficient curing of concrete to prevent raveled or broken edges.
 3. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
 4. If joint pattern not shown, provide joints not exceeding 15' in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third-bays).
- Q. Walls and Other Formed Elements:
1. Space points of deposit to eliminate need for lateral flow. Placing procedures of concrete in forms permitting escape of mortar, or flow of concrete itself, will not be permitted.
 2. Level top surface upon stopping work.
 3. Take special care to fill each part of the forms by depositing concrete directly as near final position as possible, and to force concrete under and around reinforcement, embedded items, without displacement.
 4. After concrete has taken its initial set, care shall be exercised to avoid jarring forms or placing any strain on ends of projecting reinforcement.
 5. Where backfill is placed against a wall, it shall be adequately shored until it has attained design strength.
- U. Concrete Fill at Stairs:
1. Preparation:
 - a. Remove latence, mortar, oil, grease, paint, etc.
 - b. Mechanically chip insufficiently rough surfaces.
 - c. Remove sand, etc., with compressed air.
 2. Finish stairs to profiles shown with cove at base of risers and radius at top: tool grooves at edge of treads as detailed.
- Q. Penetrations Through Concrete:

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1. Penetrations through structural concrete for conduit, piping or other items must be approved by the Architect.
2. Where such penetrations are approved, provide steel galvanized pipe sleeves as follows:
 - a. Reinforcement must not be displaced. Provide minimum $\frac{3}{4}$ " clearance between reinforcement and sleeve.
 - b. Sleeves shall be Schedule 40, 60, 80, or 160 as follows based on pipe diameter "D" per Table 3-1.
 - c. Spacing and edge distances shall conform to Table 3-1.

S. Table 3-1: Pipe Sleeves at Penetrations

Pipe Diameter "D"	A53 Pipe Thickness	Minimum Center-to-Center Spacing	Minimum Edge Distance
≤ 2"	Schedule 40	6"	4"
> 2" ≤ 4"	Schedule 60	3D	6"
> 4" ≤ 8"	Schedule 80	3½ D	1½ D
> 8" ≤ 12"	Schedule 120	4D	2D
> 12"	Not Permitted U.N.O. on Construction Documents		

3.04 CURING

- A. General Requirements:
 1. Take curing measures immediately after casting and for measures other than application of curing compound, extend for seven days. The Architect may recommend longer periods based upon prevailing temperature, wind and relative humidity. Comply with CBC Section 1905.11.
 2. Avoid alternate wetting and drying and fluctuations of concrete temperature.
 3. Protect fresh concrete from direct rays of sun, rain, freezing, drying winds, soiling, and damage.
 4. Do not permit curing method to affect adversely finishes or treatments applied to finish concrete.
- B. Curing Method, Typical: Obtain the Architect's approval of alternate measures.
 1. Keep forms and concrete surfaces moist during period forms are required to remain in place.
 2. Apply curing compound per manufacturers' recommendations, except at slabs-on-grade apply curing compound at 150% of manufacturer's recommended application coverage rate.

3.05 CLEANING, PATCHING AND DEFECTIVE WORK

- A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of

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freezing or is otherwise defective, and, in the Architect's judgement, these defects impair proper strength or appearance of the work, the Architect will require its removal and replacement at the Contractor's expense.

- B. Immediately after stripping and before concrete is thoroughly dry, patch minor defects, form-tie holes, honeycombed areas, etc., with patching mortar. Patch shall match finish of adjacent surface unless otherwise noted. Remove ledges and bulges.
- C. Compact mortar into place and neatly file defective surfaces to produce level, true planes. After initial set, dress surfaces of patches mechanically or manually to obtain same texture as surrounding surfaces.
- D. Rock Pockets:
 - 1. Cut out to full solid surface and form key.
 - 2. Thoroughly wet before casting mortar.
 - 3. Where the Architect deems rock pocket too large for satisfactory mortar patching as described, cut out defective section to solid surface, key and pack solid with concrete to produce firm bond and match adjacent surface.
- E. Cleaning
 - 1. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds if permitted and other materials employed in work of concreting which would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.
 - 2. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.
 - 3. Remove all exposed, loose fibers from slabs to the satisfaction of the architect.

3.06 PROTECTION

- A. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
- B. Protect exposed corners of concrete from traffic or use which will damage them in any way.
- C. Make provisions to keep all exposed concrete free from latence caused by spillage or leaking forms or other contaminants. Do not allow laitances to penetrate, stain, or harden on surfaces which have been textured.

3.07 FIELD QUALITY CONTROL

- A. The Owner's Testing Agency will:
 - 1. Perform testing in accordance with ACI 318 and CBC Section 1903 and 1905.
 - 2. Review concrete mix designs.
 - 3. Inspect concrete and grout placement continuously.
 - 4. Test concrete to control slumps according to ASTM C143.
 - 5. Continuously monitor concrete temperature as it arrives on the site.
 - 6. Test concrete for required compressive strength in accordance with CBC Section 1905.6:
 - a. Make and cure four specimen cylinders according to ASTM C31 for not more than each 150 cubic yards, or 5000 square ft for of surface areas of slab or walls poured each day.
 - b. Retain one cylinder for 7-day test, two for the 28-day test and hold one cylinder for additional testing as required.

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- c. Number each cylinder 1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D etc; date each set; and keep accurate record of pour each set represents.
 - d. Transport specimen cylinders from job to laboratory after cylinders have cured for 24-hours on site. Cylinders shall be covered and kept at air temperatures between 60 and 80 degrees Fahrenheit.
 - e. Test specimen cylinders at age 7-days and age 28-days for specified strength according to ASTM C39.
 - f. Base strength value on average of two cylinders taken for 28-day test.
7. Test and inspect materials, as necessary, in accordance with ACI 318, MM Test Method 227 (Coarse Aggregates) and MM Test Method 217 (Fine Aggregates), for compliance with requirements specified in this section.
8. Provide special inspection for adhesive installations as required per plan.
- B. The Contractor shall:
1. Submit ticket for each batch of concrete delivered to job site. Ticket shall bear the following information:
 - a. Design mix number.
 - b. Signature or initials of ready mix representative.
 - c. Time of batching.
 - d. Weight of cement, aggregates, water and admixtures in each batch with maximum aggregate size.
 - e. Total volume of concrete in each batch.
 - f. Notation to indicate equipment was checked for contaminants prior to batching.
 2. Pay the Owner's Testing Agency for taking core specimens of hardened structure and testing specimen according to ASTM C88 and C42 when laboratory tests of specimen cylinders show compressive strengths below specified minimum.
 3. Submit Concrete Weighmaster affidavit.

3.08 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish Work or by other construction. Concrete surface shall have texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
- C. Architectural Concrete Finish: Integrally colored concrete, using specified color additive; smooth light sandblast surface.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and

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other bonded applied cementitious finish flooring material, and as otherwise indicated.

1. After placing slabs, plane surface to tolerances for floor flatness FF of 20 and floor levelness FL of 15. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.
1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances for flatness FF of 25 and levelness FL of 20. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance. Check and level surface plane to tolerances flatness FF of 35 and levelness FL of 25. Grind smooth surface defects which would telegraph through applied floor covering system.
 2. Floors to receive traffic topping shall have steel trowel finish.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- F. Dry Shake Hardener, Wear-Resistant Finish: Provide hardened wear-resistant finish at Loading Dock floor slabs.
1. Apply dry shake materials for wear-resistant finish at rate of not less than 60 lbs. per 100 sq. ft., unless greater amount is recommended by material manufacturer.
 2. Immediately following first floating operation, uniformly distribute approximately 2/3 of required weight of dry shake material over concrete surface, and embed by means of power floating. Follow floating operation with second shake application, uniformly distributing remainder of dry shake material at right angles to first application, and embed by power floating.
 3. After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by dry shake hardener manufacturer. Apply curing compound immediately after final finishing.

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3.10 CLEAN UP

- A. Perform Work under this Section to keep affected portions of building site neat, clean, and orderly. Remove, immediately upon completion of Work under this Section, surplus materials, rubbish, and equipment associated with or used in performance. Be aware that failure to perform clean-up operations within 24 hours of notice by Architect will be considered adequate grounds for having work done by others at no added expense to the Owner.

END OF SECTION

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SECTION 03 35 00

CONCRETE FINISHING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Concrete stains and sealers, CONC-1.
 - 2. Concrete finishes.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 03 30 00 - Cast-In-Place Concrete: Provision of cast-in-place concrete.
 - 2. Section 07 92 00 - Joint Sealants: Provision of joint sealants.

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
 - 1. E1155 - Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers.
- B. EPA - Environmental Protection Agency

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements
 - 1. Provide smooth concrete surfaces at exposed cast-in-place concrete, utilizing steel, fiberglass or plastic coated forms or any other kind of material that will impart no pattern to concrete.
 - 2. Pour joints of cast-in-place concrete shall align with reveals, rustication joints and/or control joints as indicated on the Drawings.

1.04 SUBMITTALS

- A. Samples
 - 1. Stained Concrete: Submit 12 inches by 12 inches minimum sizes for selection and approval of color finishes.

1.05 QUALITY ASSURANCE

- A. Qualifications
 - 1. Applicators: Use adequate numbers of skilled workmen with 5 years' experience who are thoroughly trained and experienced in staining and sealing concrete and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Mockups for Stained Cast-In-Place Concrete: Prior to applying concrete sealer, construct mockup for finish required to demonstrate aesthetic effects. Build mockup to comply with the following requirements, using materials indicated for final unit of Work.
 - 1. Locate mockup on-site in the location indicated or, if not indicated, as directed by the Engineer.
 - a. Provide up to 3 mockups for each finish as directed by the Engineer.

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- b. Size: 48 inches by 48 inches.
- 2. Notify the Engineer 1 week in advance of the dates and times when mockup will be constructed.
- 3. Demonstrate the proposed range of aesthetic effects and workmanship.
- 4. In presence of the Engineer, demonstrate the repair of a blemished or damaged portion of an exposed-face surface.
- 5. Obtain the Engineer's approval of mockup before start of final unit of Work.
- 6. Retain and maintain mockup during construction in an undisturbed condition as a standard for judging the completed Work.
- 7. When directed, demolish and remove mockup from the Project site.
- 8. Approved mockup in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cast-In-Place Concrete: As specified in Section 03 30 00.
- B. Stain: As manufactured by L. M. Scofield Company, "Lithochrome Chemstain Classic", or equal.
 - 1. Color: As selected by the Architect.
- C. Curing and Sealing Compound at Interior and Exterior Concrete Floors, with or without Stain, CONC-1: Comply with ASTM C309 and be of same manufacturer as stain manufacturer.
 - 1. Finish: As selected by the Engineer.
 - 2. Product: As manufactured by L. M. Scofield Company, "Scofield Cureseal-W VOC", or equal.
- D. Concrete Sealer at Exterior Concrete Walls: Clear finish, VOC compliant, as manufactured by W. R. Meadows, Inc., "Lin-Seal Emulsion Sealing Compound", or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrate and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting application of sealer finish.
- B. Do not proceed with application until unsatisfactory conditions have been corrected.

3.02 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by stock form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4-inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of joints. Grout tie holes; remove and rub smooth fins or other projections.

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Surfaces remaining exposed-to-view shall have uniform color and texture acceptable to the Engineer.

1. Provide square corners where indicated on the Drawings. Chamfered corners will not be accepted.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.03 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete. Tool joint at topping concrete hardscape with finish to match field hardscape. Shiners will not be accepted.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Engineer.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Locate joints for beams and slabs in the middle third of spans.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least 1/4 of concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8-inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2-inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 92 00 are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

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- E. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.
 - 1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.04 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, pavers and other bonded applied cementitious finish flooring material, and where indicated.
 - 1. After placing slabs, finish surface to tolerance not exceeding 1/2-inch in 10 feet when tested with a 10 feet straight edge, or to tolerance of F(F) not less than 15 (floor flatness) and F(L) not less than 13 (floor levelness) measured according to ASTM E1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or as otherwise indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding 5/16-inch in 10 feet when tested with a 10 feet straightedge or to tolerance of F(F) not less than 20 (floor flatness) and F(L) not less than 15 (floor levelness) measured according to ASTM E1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Wood Float Finish: Apply wood float finish to exterior stair and walk surfaces except where noted otherwise on the Drawings. Finish surface shall have a uniform slight textured appearance without swirl marks.
- D. Trowel Finish: Apply a smooth trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, thin set ceramic or exposed paver, paint or other thin film finish coating system. Provide smooth trowel finish at dyed surfaces.
 - 1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 3/16-inch in 10 feet when tested with a 10 feet straightedge or to tolerances of not less than F(F) 30 (floor flatness) and F(L) not less than 20 (floor levelness) measured according to ASTM E1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
 - a. Trowel and Fine Broom Finish: Where ceramic or paver tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- E. Nonslip Broom Finish: Apply a light, nonslip broom finish to Utility Rooms concrete platforms and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with the Engineer before application.

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- F. Sealing and Hardener Finishes: Apply a coat of the curing and sealing or curing and hardening compound as specified in Section 03 30 00 to concrete stairs, Trash Rooms and aprons, Machine and Equipment Rooms, and where compound is indicated on the Drawings. Apply compound in strict accordance with manufacturer's directions.
- G. Nonslip Aggregate Finish: Apply nonslip aggregate finish to concrete, exterior paving and where indicated.
 - 1. After completing float finishing and before starting trowel finish, uniformly spread dampened nonslip aggregate at a rate of 25 pounds per 100 square feet of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.
 - 2. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.

3.05 STAINED CONCRETE

- A. Stain: Apply in accordance with manufacturer's instructions.
 - 1. After final application has remained on the surface for a minimum of approximately 4 hours, all residue shall be removed by wet scrubbing with a high quality, commercial detergent, using a rotary floor machine or stiff-bristle brush in accordance with manufacturer's instructions.
 - 2. Surface shall be rinsed after scrubbing until the rinse water is completely clean.
 - 3. Stain residue, runoff liquid and absorbent materials used during application and discarded equipment shall be disposed in accordance with local, State and Federal regulations.

3.06 SEALING AT INTERIOR FLOORS AND EXTERIOR PAVING AND EXTERIOR CONCRETE WALLS

- A. Prepare dry, cured concrete surfaces according to manufacturer's instructions.
- B. At concrete floors and paving, apply sealer uniformly in 2 coats at manufacturer's recommended rate. After first coat has dried, apply second coat at 90 degrees from first coat.
- C. Verify adequacy of slip resistance of concrete floors and paving.

3.07 CONCRETE SURFACE REPAIRS

- A. Intent of this Specification is to require forms, mixtures of concrete and workmanship so that concrete surfaces will require no patching, except for plugging of tie holes.
- B. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to the Engineer.
- C. Mix dry-pack mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 - 1. Cut out honeycombs, rock pockets, voids over 1/4-inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 - 2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding

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with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

- D. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the Engineer. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- E. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01-inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to the Engineer.
 4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- F. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- G. Perform structural repairs as specified in Section 03 30 00.
- H. Repair methods not specified above may be used, subject to acceptance of the Engineer.

END OF SECTION

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SECTION 03 54 13

GYP SUM CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Gypsum concrete.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Section
 - 1. Section 03 33 00 - Cast-In-Place Concrete: Provision of cast in place concrete.

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
 - 1. C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete.
- B. IRC - International Residential Code, 2021

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
- B. Letters of Certification
 - 1. Resilient Matting Manufacturer: Submit letter stating that the installation of the matting conforms to manufacturer's standards.
 - 2. Hard Surface Flooring Manufacturer: Submit letter stating that resilient matting is acceptable as an installation under the hard surface flooring.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with provisions of IRC and listed test reports when part of a fire rated or solid assembly.
- B. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed Work, shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Maxxon Corp., "Gyp-Crete 2000/3.2K", or equal.

2.02 MATERIALS

- A. Gypsum Cement: Floor underlayment gypsum cement.
- B. Sand Aggregate: Sand shall be 1/8-inch or less, washed masonry or plaster sand.

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- C. Mix Water: Potable, free from impurities.
- D. Waterproof Strip: 4 inches wide waterproof strip, as recommended by gypsum underlayment manufacturer for protection of gypsum board or products that may be damaged by moisture or breed mold or mildew due to moisture absorption.
- E. Isolation Strip: 1/4-inch perimeter isolation board.
- F. Acoustical Isolation Pad at Wood Framing: Black entangled mesh on white fabric, 40 percent recycled content, 3/8-inch thick, as manufactured by Maxxon Corp., "Acousti-Mat II"; Keene Building Products, "Quiet Qurl 55/025 MC", or equal.
- G. Non-hardening silicone or latex caulk.
- H. Non-water soluble tape.

2.03 MIX DESIGNS

- A. General Requirements: Mix proportions and methods shall be in strict accordance with product manufacturer recommendations.
 - 1. Provide 2,500 psi gypsum underlayment; maximum density 120 lbs/cu. ft.
 - 2. Minimum 1-inch thick, unless otherwise indicated on the Drawings.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Condition and Cleaning of Subfloor: Subfloor shall be structurally sound. Clean subfloor to remove mud, oil, grease and other contaminating factors before the arrival of underlayment.
- B. Leak Prevention: Fill cracks and voids with quick setting patching or caulking materials where leakage of gypsum concrete could occur.
- C. Tape off and protect gypsum board from moisture absorption.
- D. Install perimeter isolation strip to eliminate any direct contact of floor topping with wall finishes, pipes, conduits, etc., that may transmit sound.
- E. Install acoustical isolation pads in accordance with manufacturer's written instructions to eliminate any direct contact of cementitious floor topping with substrate. Tape all seams and joints. No gaps or openings shall be allowed in the resilient matting.

3.02 PLACING GYPSUM CONCRETE

- A. After installation of gypsum board on wall framing, install 4 inches wide waterproof strip at base of gypsum board to protect gypsum board from moisture intrusion from gypsum concrete. Extend 2 inches up wall and 2 inches over subfloor.
- B. Place gypsum concrete over floor sheathing at thickness indicated on the Drawings. Place underlayment and gypsum concrete under bathtubs prior to installation of bathtubs. Except at authorized joints, place concrete as continuously as possible until application is complete so that no concrete product slurry is placed against the product that has obtained its initial set.
- C. Spread and screed gypsum concrete to a smooth surface. Finish float gypsum concrete for application of ceramic tile, resilient flooring, and carpet.

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- D. Drying: Provide continuous ventilation to rapidly remove moisture from the area until the concrete is dry. Provide mechanical ventilation if necessary. To test for dryness, tape 24 inches by 24 inches section of plastic to the surface of the underlayment. After 48 to 72 hours, if no condensation occurs, the underlayment shall be considered dry. Perform dryness test 5 to 7 days after pour.

3.03 FIELD QUALITY CONTROL

- A. Slump Test: Test gypsum concrete for slump as it is being pumped using 2 inches by 4 inches cylinder resulting in a patty size of 8 inches plus or minus 1 inch diameter.
- B. Field Samples: At least 1 set of 3 molded cube samples shall be taken from each day's pour during the gypsum concrete application. Cubes shall be tested as recommended by the manufacturer in accordance with ASTM C472. Test results shall be made available to the Architect, Owner, and Contractor.

3.04 PROTECTION

- A. Protection From Heavy Loads: During construction, place temporary wood planking over gypsum concrete wherever it will be subject to heavy wheeled or concentrated loads.
- B. Protect gypsum concrete from inclement weather.

END OF SECTION

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SECTION 05 50 00

METAL FABRICATIONS

1.01 SUMMARY

- A. Section Includes: Design, engineer, furnish and install miscellaneous metal, including design of support systems.
 - 1. Non-structural miscellaneous metal channels, angle imbeds, and other shapes as required.
 - 2. Rough hardware.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Section
 - 1. Section 09 90 00 - Painting and Coating: For finish painting of items not specified to have factory finish.

1.02 REFERENCES

- A. AISC - American Institute of Steel Construction
- B. ANSI - American National Standards Institute
 - 1. B18.6.3 - Machine Screws and Machine Screw Nuts (M4).
 - 2. B18.21.1 - Lock Washers (Inch Series)
 - 3. B18.22.1 - Plain Washers.
- C. ASTM - American Society for Testing and Materials
 - 1. A27 - Standard Specification for Steel Castings, Carbon, for General Application.
 - 2. A36 - Standard Specification for Carbon Structural Steel.
 - 3. A47 - Standard Specification for Ferritic Malleable Iron Castings.
 - 4. A48 - Standard Specification for Gray Iron Castings.
 - 5. A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 6. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 7. A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
 - 8. A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - 9. A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 10. A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 11. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 12. A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - 13. A786 - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
 - 14. B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - 15. C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).
 - 16. C157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.

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17. C191 - Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.
 18. D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 19. E488 - Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
 20. F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 21. F594 - Standard Specification for Stainless Steel Nuts.
- D. AWS - American Welding Society
1. D1.1 - Structural Welding Code - Steel.
 2. D1.3 - Structural Welding Code - Sheet Steel.
- E. CBC - California Building Code, 2019 Edition
- F. FS - Federal Specification
1. FF-B-588 - Bolt, Toggle, and Expansion Sleeve, Screw.
- G. NAAMM - National Association of Architectural Metal Manufacturers
1. MFM - Metal Finishes Manual for Architectural and Metal Products.
- H. SSPC - The Society for Protective Coatings
1. PA 1 - Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel.
 2. SP 2 - Surface Preparation Specification No. 2: Hand Tool Cleaning.
 3. SP 3 - Surface Preparation Specification No. 3: Power Tool Cleaning.
 4. SP 6 - Surface Preparation Specification No. 6: Commercial Blast Cleaning.

1.03 SYSTEM DESCRIPTION

- A. Design Requirements
1. Wind Load Requirements for Exterior Items: Design and size members to withstand dead and live loads caused by pressure and suction of wind in accordance with CBC.
 2. Design work to support normally imposed loads and in conformity with AISC requirements.
 3. Provide for expansion and contraction.
 4. Design exterior items to exclude water.
 5. Shop drawings and calculations for metal fabrications engineered under work of this Section shall be prepared under direct supervision of State of California licensed Structural Engineer and shall be so wet stamped and wet signed.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for paint products and grout.
- B. Shop Drawings: Submit shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
- C. Quality Control Submittals: Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

1.05 QUALITY ASSURANCE

- A. Welding Standards: Comply with applicable provisions of AWS D1.1 and AWS D1.3.

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1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- B. Steel and Iron
 1. General: Maximize use of recycled steel with minimum 30 percent recycled.
 2. Steel Plates, Shapes and Bars: ASTM A36.
 3. Rolled Steel Floor Plate: ASTM A786, rolled from plate complying with ASTM A36 or ASTM A283, Grade C or D.
 4. Cold-Formed Steel Tubing: ASTM A500.
 5. Steel Pipe: ASTM A53, Type S, Grade B, Schedule 40, unless otherwise indicated, or another weight required by structural loads.
 - a. Black finish, unless otherwise indicated.
 - b. Prime as specified below.
 6. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A666, Type 304.
 7. Gray-Iron Castings: ASTM A48, Class 30.
 8. Malleable-Iron Castings: ASTM A47, grade as recommended by fabricator for type of use indicated.
- C. Concrete Inserts: Anchors of type indicated below, fabricated from corrosion resistant materials capable of sustaining, without failure, and with the capability of sustaining loads imposed in accordance with CBC.
 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A47 malleable iron or ASTM A27 cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized in accordance with ASTM A153.
 2. Provide weld plate imbedded in concrete as required for installation of adjacent work. Coordinate location with other imbedded materials.
- D. Fasteners: Provide plated fasteners complying with ASTM B633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls, concrete slabs or ceilings. Select fasteners for the type, grade, and class required.
 1. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A, with hex nuts, ASTM A563, and, where indicated, flat washers.
 2. Machine Screws: ANSI B18.6.3.
 3. Plain Washers: Round, carbon steel, ANSI B18.22.1.
 4. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.
 5. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
 - a. Material: Carbon steel components zinc-plated to comply with ASTM B633, Class Fe/Zn 5.
 - b. Material: Group 1 alloy 304 or 316 stainless steel bolts and nuts complying with ASTM F593 and ASTM F594.
 6. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.
 7. Epoxy Cement: As manufactured by Simpson Strong-Tie, "SET/ET/AT High Strength Anchoring Adhesives", or equal.

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- E. Welding Materials: AWS D1.1, type required for materials being welded.
- F. Typical: Only exterior steel products shall be galvanized.

2.02 STANDARD CATALOG PRODUCTS

- A. Non-Shrink Grout
 1. Premixed; containing no metallic particles, requiring only addition of water.
 2. Shall conform to CRD-C621 at fluid consistency and shall have minimum working time of 15 minutes and initial set time of 30 to 45 minutes in accordance with ASTM C191.
 3. Manufacturer: Master Builders Technologies, "Masterflow 928"; Five Star Products, Inc., "Five Star Grout 100", or equal.
- B. Expansion Cement
 1. Non-metallic, non-corrosive, pourable hydraulic type cement that is quick-setting high strength, and non-shrinking, with the following properties
 - a. Compressive Strength: 58,400 psi at 7 days in accordance with ASTM C109.
 - b. Volume Change: Plus 0.31 at 7 days in accordance with ASTM C157.
 2. Water: Potable.
 3. Manufacturer: Custom Building Products, model "Pour-Stone"; Minwax Construction Products, "Por-Rok Anchoring Cement", or equal.
- C. Coatings
 1. Coatings for Protection of Dissimilar Materials
 - a. Dissimilar Metals: Bituminous type materials conforming with MIL Standard 889.
 - b. Aluminum in Contact with Concrete, Metal, Wood, or other Absorptive Material.
 2. Shop Primer for Ferrous Metal: VOC compliant, fast-curing, lead and chromate free, universal modified alkyd primer with good resistance to corrosion, compatible with finish paint systems.
 3. Galvanizing Repair Paint: High zinc dust content paint, with dry film containing not less than 94 percent zinc dust by weight, as manufactured by Parker Amchem, "Galvaprep SG"; Sherwin Williams, "Zinc Clad I", or equal.
 4. Exterior metal components/fabrications that are intended to be exposed at the completion of construction and their attachments shall be shop treated with galvanic "metalized" process; then shop primed, and painted as indicated herewith. Pretreat metal components where, due to fabrication details, components are installed lapped over adjacent components to the extent that the galvanic process is unobtainable or compromised at the laps.

2.03 FABRICATION, GENERAL

- A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on Construction Drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and

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fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 100 degrees Fahrenheit.
- D. Shear and punch metals cleanly and accurately. Remove burrs.
- E. Ease exposed edges to a radius of approximately 1/32-inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F. Remove sharp or rough areas on exposed traffic surfaces.
- G. Weld corners and seams continuously to comply with the following
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
- H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- I. Provide for anchorage of type required for conditions; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support loads.
- J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.04 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.
- B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
 - a. Except as otherwise indicated, space anchors 24 inches on center and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4-inch thick by 8 inches long.
- C. Galvanize miscellaneous exterior framing and supports.

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2.05 FINISHES, GENERAL

- A. Comply with NAAMM MFM for recommendations relative to applying and designing finishes. Finish metal fabrications after assembly.

2.06 STEEL AND IRON FINISHES

- A. Exterior metal components/fabrications that are intended to be exposed at the completion of construction and their attachments shall be shop treated with galvanic "metalized" process; then shop primed, and painted as indicated herewith.
- B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications.
 - 1. Typical: SSPC SP 2, SSPC SP 3 as required.
 - 2. Architectural Exposed Steel Fabrications: SSPC SP 6.
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete or masonry, unless otherwise indicated. Comply with requirements of SSPC PA 1 for shop painting.
- D. Finish Painting: As specified in Section 09 90 00.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required. Fastenings to post tension concrete shall be by cast-in-place embed only. Fasteners not installed but required after pour shall be submitted to the Engineer for approval. Fastener shall not be installed until the Engineer approval is received.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels. No cutting or drilling shall occur in post tension concrete slab without Structural Engineer's approval.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been galvanized after fabrication and are intended for bolted or screwed field connections.
- E. Field Welding
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

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- 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.02 SETTING

- A. Set item shown or required to be installed in sleeves with quick-setting anchor cement unless otherwise noted.
- B. Use non-shrink grout mixed in accordance with manufacturer's directions for setting plates, bolts, and similar items.

3.03 ADJUSTING AND CLEANING

- A. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and prime and paint exposed areas with same material as used for shop painting to comply with SSPC PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a 2.0-mil minimum dry film thickness.
- B. For galvanized surfaces, clean welds, bolted connections and abraded areas, and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

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SECTION 06 05 73

WOOD TREATMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: Fire retardant treatment for plywood backing boards for electrical equipment.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Section
 - 1. Section 06 20 00 - Finish Carpentry: Provision of finish carpentry.

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
 - 1. D3201 - Standard Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Base Products.
- B. AWPA - American Wood Preservers' Association
 - 1. C20 - Structural Lumber - Fire Retardant Treatment by Pressure Processes.
 - 2. C27 - Plywood - Fire-Retardant - Pressure Treatment.
- C. UL - Underwriters Laboratories, Inc.
 - 1. BMD - Building Materials Directory

1.03 SUBMITTALS

- A. Product Data: Submit product data for wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation and finishing of treated material:
 - 1. For each type of preservative treated wood product include certification by treating plant stating type of preservative solution and pressure process used; net amount of preservative retained, and compliance with applicable standards.
 - 2. For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to Project site.
 - 3. For fire retardant treated wood products include certification by treating plant that treated material complies with specified standard and other requirements.
- B. Quality Control Submittals
 - 1. Certificates: Submit certificates certifying compliance with standards designated; indicate items treated, chemical used and retention obtained.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Acceptable Manufacturer
 - 1. Interior Type Fire Retardant Treated Wood
 - a. Hickson Corporation, "Dricon".
 - b. Hoover Treated Wood Products, "Pyro-Guard".

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- c. Osmose Wood Preserving Co, Inc., "Flameproof LHC-HTT", or approved equal.

2.02 FIRE RETARDANT TREATMENT BY PRESSURE PROCESS

- A. General: Where fire retardant treated plywood is indicated, pressure impregnate plywood with fire retardant chemicals to comply with AWPA C20 and C27, respectively, for treatment type indicated; identify "fire retardant treated wood" with appropriate classification marking of UL BMD listed "FR-S" with same moisture content as untreated wood in tests conducted in accordance with ASTM D3201 at relative humidity up to 95 percent.
 - 1. Fire retardant chemicals used shall be free of halogens, sulfates, ammonium phosphate and formaldehyde.
 - 2. Current Evaluation/Research Reports: Provide fire retardant treated wood for which a current model code evaluation/research report exists that is acceptable to authorities having jurisdiction and that evidences compliance of fire retardant treated wood for application indicated.
- B. Interior Type: For interior locations use fire retardant chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:
 - 1. No reduction takes place in bending strength, stiffness, and fastener holding capacities below values published by manufacturer of chemical formulation that are based on tests by a qualified independent testing laboratory of treated wood products identical to those indicated for this Project under elevated temperature and humidity conditions simulating installed conditions.
 - 2. No other form of degradation occurs due to acid hydrolysis or other causes related to manufacture and treatment.
 - 3. No corrosion of metal fasteners results from their contact with treated wood.
- C. Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

PART 3 - EXECUTION

3.01 FIELD CUTS

- A. Field-treat cuts and holes in pressure-treated wood with same material as used in treatment.

END OF SECTION

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SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - a. Structural dimension lumber framing.
 - b. Exposed timber structural framing.
 - c. Non-structural dimension lumber framing.
 - d. Rough opening framing for doors, windows, and roof openings.
 - e. Sheathing.
 - f. Subflooring.
 - g. Roof-mounted curbs.
 - h. Roofing nailers.
 - i. Roofing cant strips.
 - j. Preservative treated wood materials.
 - k. Fire retardant treated wood materials.
 - l. Miscellaneous framing and sheathing.
 - m. Concealed wood blocking, nailers, and supports.

1.02 REFERENCES

- A. California Code of Regulations, Title 24, Part II, 2016 Edition, also known as the California Building Code (CBC)
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.
- E. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- G. AWPA U1 - Use Category System: User Specification for Treated Wood; 2017.
- H. PS 1 - Structural Plywood; 2009.
- I. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.
- J. PS 20 - American Softwood Lumber Standard; 2015.
- K. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; 2004, and supplements.
- L. WWPA G-5 - Western Lumber Grading Rules; 2011.

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1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.
- D. Samples: For rough carpentry members that will be exposed to view, submit two samples, ____by____ inch in size illustrating wood grain, color, and general appearance.
- E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 – PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Stud Framing (2 by 2 through 2 by 6):
 - 1. Species: Douglas Fir-Larch.
 - 2. Grade: No. 2.
- D. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
 - 1. Species: Douglas Fir-Larch.
 - 2. Grade: No. 1.

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- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 EXPOSED TIMBERS

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (20 percent maximum).
- C. Surfacing: S4S.
- D. Species: Redwood.
- E. Grade: Clear Heart Structural.

2.04 STRUCTURAL COMPOSITE LUMBER

- A. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.
 - 1. Beams: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published E (modulus of elasticity): 2,000,000 psi, minimum.
 - 2. Manufacturers:
 - a. Weyerhaeuser: www.weyerhaeuser.com.
 - b. Boise Cascade; ____: www.bc.com.
 - c. Georgia-Pacific Corp.; ____: www.buildgp.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 CONSTRUCTION PANELS

- A. Subfloor/Underlayment Combination: Any PS 2 type, rated Single Floor.
 - 1. Bond Classification: Exterior.
 - 2. Span Rating: 48.
 - 3. Performance Category: 1-1/8 PERF CAT.
 - 4. Edges: Tongue and groove.
- B. Subfloor/Underlayment Combination: Oriented strand board wood structural panel; PS 2, rated Single Floor.
 - 1. Bond Classification: Exterior.
 - 2. Performance Category: 19/32 PERF CAT.
 - 3. Span Rating: 20.
 - 4. Edges: Tongue and groove.
 - 5. Surface Finish: Fully sanded face.
 - 6. Provide fastening guide on top panel surface with separate markings indicating fastener spacing for 16 inches, 19.2 inches and 24 inches on center, respectively.
- C. Subflooring: Any PS 2 type, rated Sheathing.
 - 1. Bond Classification: Exterior.
 - 2. Span Rating: 48.
 - 3. Performance Category: 3/4 PERF CAT.
- D. Roof Sheathing: Oriented strand board wood structural panel; PS 2.
 - 1. Grade: Structural 1 Sheathing.
 - 2. Bond Classification: Exposure 1.
 - 3. Performance Category: 5/8 PERF CAT.

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4. Span Rating: 40/20.
 5. Edges: Tongue and groove.
- E. Roof Sheathing: Oriented strand board structural wood panel, PS 2, with factory laminated roofing underlayment layer.
1. Sheathing Panel:
 - a. Grade: Structural 1 Sheathing.
 - b. Size: 4 feet wide by 8 feet long.
 - c. Performance Category: 5/8 PERF CAT.
 - d. Span Rating: 40/20.
- F. Wall Sheathing: Any PS 2 type.
1. Bond Classification: Exterior.
 2. Grade: Structural I Sheathing.
 3. Span Rating: 24.
 4. Performance Category: 1/2 PERF CAT.
 5. Edge Profile: Square edge.
- G. Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I.
- H. Wall Sheathing: Oriented strand board wood structural panel; PS 2.
1. Grade: Structural 1 Sheathing.
 2. Bond Classification: Exposure 1.
 3. Performance Category: 5/8 PERF CAT.
 4. Span Rating: 40/20.
 5. Edges: Square.

2.06 ACCESSORIES

- A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
- B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.
- C. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- D. Subfloor Glue: Waterproof, air cure type, cartridge dispensed.

2.07 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Fire Retardant Treatment:
1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index

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of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.

- a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat all exterior rough carpentry items.
 - c. Do not use treated wood in direct contact with the ground.
- C. Preservative Treatment:
1. Preservative Pressure Treatment of Lumber Above Grade: AWWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with roofing, flashing, or waterproofing.
 - d. Treat lumber in contact with masonry or concrete.
 2. Preservative Pressure Treatment of Plywood Above Grade: AWWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- B. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION – GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC (WFCM) Wood Frame Construction Manual, and _____.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

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- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.05 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

3.06 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring/Underlayment Combination: Glue and nail to framing; staples are not permitted.
- B. Subflooring: Glue and nail to framing; staples are not permitted.
- C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails.

3.07 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

END OF SECTION

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SECTION 06 20 00

FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provision of door frames, batten boards, and trim.
 - 2. Provision of interior fire treated plywood at electrical panels.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 06 05 73 - Wood Treatment: Provision of wood treatment.
 - 2. Section 09 90 00 - Painting and Coating: For field finish painting.

1.02 REFERENCES

- A. APA - American Plywood Association
- B. ASTM - American Society for Testing and Materials
 - 1. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. DOC - Department of Commerce
 - 1. PS 1 - Structural Plywood.
- D. FS - Federal Specifications
 - 1. TT-P-00791B(2) - Putty: Linseed-Oil Type.
- E. WI - Woodwork Institute

1.03 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for plastic laminate faced plywood window sills. Show layout, joint detail, attachment details. Identify minimum clearances, where required.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All interior finishes shall meet the current CARB ATCM for Composite Wood by mandatory compliance dates.
- B. Manufactured wood products shall meet 2013 CalGreen emissions requirements.
- C. Lumber shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification. Lumber shall be of sound stock, thoroughly seasoned, kiln-dried to a moisture content not exceeding 19 percent, and surfaced 4 sides, except as specifically designated for items hereinafter.

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- D. Material Grades: Confirm with the Architect.
 - 1. Plywood
 - a. Type 1: APA, A-B Grade Interior, 3/4-inch thick. with plain sliced Birch veneer.
 - b. Type 2: DOC PS 1, impregnated with fire-retardant chemicals by a pressure process or other means acceptable to authorities having jurisdiction to produce a flame-spread index of not greater than 25 when tested according to ASTM E84.
 - 2. Exterior Wood Trim: Redwood.
 - 3. Wood Bench at Showers: Redwood.
 - a. Metal Wall Brackets: Stainless steel.
- E. Plastic Laminate
 - 1. Typical: High pressure general purpose grade, solid colors with textured surfaces.
 - a. Plastic Thickness and Grade: meet requirements of NEMA LD 3.
 - b. Adhesive: As recommended by plastic laminate manufacturer.
 - 2. Colors: As selected by the Architect.
 - 3. Manufacturer: Formica Corp., Hartmark, or equal.
- F. Fasteners
 - 1. Provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A153, length of fastener embed into wood substrate to equal 1-1/2 times thickness of items fastened.
 - 2. Countersink nails and fill surface where nailing is unavoidable. Sand smooth and flush and prime.
- G. Adhesives: Comply with manufacturer's recommendations for adhesives, VOC compliant.
- H. Glue: Aliphatic or phenolic-resin wood glue recommended by manufacturer for general carpentry use, VOC compliant.
- I. Putty: Linseed oil type, complying with FS TT-P-00791B(2), tinted to match surface finish color.
- J. Finish Painting: As specified in Section 09 90 00.

2.02 FABRICATION

- A. Preparation
 - 1. Verify measurements at Project site.
 - 2. Verify details and dimensions of fixtures integral with finish carpentry for proper fit and accurate alignment.
- B. General Fabrication Requirements
 - 1. Factory-fabricate and assemble work in complete units insofar as dimensions permit shipment and installation.
 - 2. Kerf backs of solid members more than 5 inches wide or more than 1 inch nominal thickness.
 - 3. Conceal nailing where possible and set nail heads for putty in exposed portions.
 - 4. Perform corrective measures necessitated by non-conformance with WI standards. The Engineer's opinion shall govern discrepancies.
 - 5. Preprime exterior wood and field prime end cuts.

2.03 FINISHES

- A. Shop Finishing: Provide items specified in this Section to be fabricated in accordance with WI standards shop finished.

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- B. Field Finishing
 - 1. Touch-Up: Touch-up items specified to be shop finished in accordance with requirements of WI.
 - 2. Items Other Than Those Specified to Be Shop Finished:
 - a. Set exposed fasteners. Apply putty in exposed fastener indentations. Sand work smooth and prime.
 - b. Finish paint in accordance with requirements of Section 09 90 00.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation, for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.
- C. Backprime concealed sides of interior lumber.

3.02 INSTALLATION

- A. General
 - 1. Set work square, level, plumb with edges scribed, accurate and secure in place with fastenings, clips, braces, brackets, anchors, shims and blocks.
 - 2. Conceal nailing and screwing where possible and set nail heads for putty in exposed portion and conceal screws.
 - 3. Miter inside and outside corners of running trim; bevel end joints together.
 - 4. Joints of trim shall not be less than 6 feet.
 - 5. Install to tolerance of 1/8-inch in 96 inches for plumb and level. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
- B. Do not use finish carpentry materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
- C. Wood Surfaces
 - 1. Thoroughly hand sand. Take care that cross sanding is removed by final sanding in direction of grain; ease "knife-edge" corners by sanding.
 - 2. Free from dust, glue, stains, and other foreign matter and in proper condition to receive finish.
- D. Fire-Retardant Treated Plywood (Plywood Type 2): Install after components of rated wall assembly, including taping. Paint plywood before installation of equipment.

3.03 ADJUSTING

- A. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

END OF SECTION

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SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Provision of thermal blanket insulation.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Section
 - 1. Section 06 10 00 - Rough Carpentry: Provision of wood framing.

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
 - 1. C165 - Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
 - 2. C303 - Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
 - 3. C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 4. C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 5. C991 - Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings.
 - 6. C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
 - 7. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 8. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
 - 9. E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests.
- B. CBC - California Building Code, 2019 Edition

1.03 SYSTEM DESCRIPTION

- A. Performance Requirement: Insulation shall contain no added formaldehyde.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for insulation products specified.
- B. Certifications: Submit certification that insulation was furnished and installed in accordance with CBC requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location.

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Comply with manufacturer's recommendations for handling, storage and protection during installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Acoustical Blanket Insulation
 - 1. Unfaced, 3-1/2 inches thick, friction-fit, flexible batt or blanket of fiberglass, 15 inches width to fit stud space, and conforming to ASTM C665, Type I, non-combustible when tested in accordance with ASTM E136, and having the following fire resistive requirements when tested in accordance with ASTM E84:
 - a. Flame Spread: 10 or less.
 - b. Smoke Developed: 10 or less.
 - 2. Product: As manufactured by Owens-Corning Fiberglas Corp., "Thermal Batts Insulation"; Johns Manville Corp., or equal.
- B. Insulation Support: Galvanized springwire and staples as required.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions with installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's instructions applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.
- B. Extend insulation full thickness as indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.
- C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness of the cavity being filled.

3.03 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, use mechanical anchorage to provide permanent placement and support of units.
- B. Maintain required separations from electric fixtures and appliances.

3.04 PROTECTION

- A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where

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insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

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SECTION 09 81 16

ACOUSTIC BLANKET INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Provision of concealed acoustical blanket insulation.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Section
 - 1. Section 06 10 00 - Rough Carpentry: Provision of wood framing.

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
 - 1. C165 - Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
 - 2. C303 - Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
 - 3. C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 4. C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 5. C991 - Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings.
 - 6. C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
 - 7. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 8. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
 - 9. E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests.
- B. CBC - California Building Code, 2019 Edition

1.03 SYSTEM DESCRIPTION

- A. Performance Requirement: Insulation shall contain no added formaldehyde.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for insulation products specified.
- B. Certifications: Submit certification that insulation was furnished and installed in accordance with CBC requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location.

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Comply with manufacturer's recommendations for handling, storage and protection during installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Acoustical Blanket Insulation
 - 1. Unfaced, 3-1/2 inches thick, friction-fit, flexible batt or blanket of fiberglass, 15 inches width to fit stud space, and conforming to ASTM C665, Type I, non-combustible when tested in accordance with ASTM E136, and having the following fire resistive requirements when tested in accordance with ASTM E84:
 - a. Flame Spread: 10 or less.
 - b. Smoke Developed: 10 or less.
 - 2. Product: As manufactured by Owens-Corning Fiberglas Corp., "Thermal Batts Insulation"; Johns Manville Corp., or equal.
- B. Insulation Support: Galvanized springwire and staples as required.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions with installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's instructions applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.
- B. Extend insulation full thickness as indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.
- C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness of the cavity being filled.

3.03 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, use mechanical anchorage to provide permanent placement and support of units.
- B. Maintain required separations from electric fixtures and appliances.

3.04 PROTECTION

- A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where

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insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

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SECTION 07 46 23

WOOD SIDING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Exterior vertical wood board and batten siding and board trim.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 06 20 00 - Finish Carpentry: Provision of exterior standing and running trim.
 - 2. Section 07 65 00 - Flexible Flashing: Provision of flexible flashing.
 - 3. Section 07 92 00 - Joint Sealants: Provision of sealers.
 - 4. Section 09 90 00 - Painting and Coating: For back priming wood boards and staining boards.

1.02 REFERENCES

- A. FSC - Forest Stewardship Council
- B. NLGA - National Lumber Grades Authority

1.03 SUBMITTALS

- A. Samples
 - 1. Wood Designated to Receive Semi-Transparent Finish
 - a. Provide minimum of four 6 inches by 18 inches samples for each different type of wood and finish.
 - b. Resubmit material samples with finishes adjusted as directed, until material and finish are accepted.
 - 2. Additional wood samples in small quantities as may be requested for trial application of finishes.

1.04 QUALITY ASSURANCE

- A. Qualifications
 - 1. Installer: Engage an experienced installer who has completed finish carpentry similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Mockups: Before installing wood siding, construct sample panel to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockup to comply with the following requirements, using materials indicated for completed Work.
 - 1. Locate mockup in the location as directed by the Architect.
 - 2. Notify the Architect 7 days in advance of the date and time when mockup will be constructed.
 - 3. Maintain mockup during construction in an undisturbed condition as a standard for judging the completed Work.
 - 4. Approval of mockup does not constitute approval of deviations from Contract Documents contained in mockup, unless such deviations are specifically approved by the Architect in writing.

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1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber. Provide for air circulation within and around stacks and under temporary coverings.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements: Proceed with installing wood siding only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's recommendations and warranty requirements and at least 1 coat of specified finish to be applied without exposure to rain or dampness.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Inspection Agency: NLGA.
- B. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
 - 1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.
- C. Wood Preservative Treated Materials: As specified in Section 06 05 73.

2.02 LUMBER

- A. Board Siding
 - 1. Species: Redwood, tongue and groove, for stained finish. Match existing.
 - 2. Grade: Clear or A and better.
 - 3. Dimensions: As indicated on the Drawings.
- B. Board Battens
 - 1. Species: Redwood.
 - 2. Dimensions: 2 inches.

2.03 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide stainless steel Type 304 nails, in sufficient length to penetrate minimum of 1-1/2 inches into substrate.
- B. Flexible Flashing: As specified in Section 07 65 00.
- C. Weather Barrier: As specified in Section 07 68 00.
- D. Sealants: As specified in Section 07 92 00.

2.04 FABRICATION

- A. Wood Moisture Content: Comply with requirements of specified inspection agencies and manufacturer's recommendations for moisture content of finish carpentry on relative humidity conditions existing during time of fabrication and in installation areas.

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- B. Fabricate finish carpentry to dimensions, profiles, and details indicated.
 - 1. Back out or kerf backs of exterior standing and running trim wider than 5 inches, except members with ends exposed in finished work.
 - 2. Square edges, ease knife edge corners by sanding.

2.05 FINISH

- A. Back Priming: As specified in Section 09 90 00.
- B. Face: Stain.
 - 1. Color: As selected by the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and performance of wood siding. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Backprime lumber for clear finish exposed on the exterior. Comply with requirements for surface preparation and application in Section 09 90 00.
- C. Weather Resistive Barrier: Apply weather resistive barrier over substrate; weatherlap horizontal edges 4 inches minimum and vertical edges 6 inches minimum. Fasten in place.

3.03 INSTALLATION, GENERAL

- A. Do not use siding materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
- B. Install finish carpentry plumb, level, true, and aligned with adjacent materials. Use concealed shims where required for alignment.

3.04 SIDING INSTALLATION

- A. Do not use siding materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
- B. Install finish carpentry plumb, level, true, and aligned with adjacent materials. Use concealed shims where required for alignment.
- C. Flashing: Install flashing as detailed.

3.05 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full length pieces from maximum lengths of lumber available. Do not use pieces less than 48 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.
 - 1. Match color and grain pattern across joints.

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2. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.

3.06 ADJUSTING

- A. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

3.07 PROTECTION

- A. Provide final protection and maintain conditions that ensure finish carpentry is without damage or deterioration at the time of Substantial Completion.

END OF SECTION

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SECTION 07 65 00

FLEXIBLE FLASHING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Flexible membrane flashing at exterior wall openings, and at other conditions as detailed in the Drawings.
 - 2. Liquid applied flashing.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 07 46 23 - Wood Siding: Provision of wood siding.
 - 2. Section 08 91 19 - Fixed Louvers: Provision of fixed louvers.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's most current product data and installation instructions, including manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and data for physical and performance properties.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer approved by flexible flashing membrane manufacturer.
- B. Mockup: Apply flexible flashing to typical window opening to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality for approval by the Engineer.
 - 1. If the Engineer determines mockups do not comply with requirements, reapply flexible flashing until mockups are approved.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Pre-Installation Conference: Conduct conference at Project site.
 - 1. Include installers of other construction connecting to flexible flashing, such as weather resistive barrier and windows.
 - 2. Review flexible flashing requirements including surface preparation, substrate condition, forecasted weather conditions, special details and sheet flashings, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection
 - 1. Store materials in their original undamaged packages in clean, dry protected location and within temperature range required by flexible flashing membrane manufacturer.
 - 2. Protect stored materials from direct sunlight.

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1.05 PROJECT CONDITIONS

- A. Environmental Requirements: Do not apply to moist or damp surfaces.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Flashing
 1. Typical: Fortifiber, "Fortiflash", or equal.
 2. High-Temperature: Fortifiber, "Fortiflash Butyl", or equal.
 3. W. R. Grace & Co., "PermaBarrier Liquid with Reinforcing Fabric", or equal.

2.02 MATERIALS

- A. Flashing Paper: Fiber reinforced waterproof flashing paper.
- B. Flashing at Louvers and Vents: Self-sealing, self-healing, fully adhered, composite flexible flashing. Flashing shall be 25 mil minimum thickness sheet consisting of a strong reinforced polymer membrane coated with a 3-inch self-adhesive strip. The rolls shall be interwound with a disposable silicone-coated release sheet. Flashing shall be from rolls of 12 inches width, unless otherwise indicated.
 1. Prefabricated Corners at Sill: As manufactured by Grace Construction Products, "Sill Corners", or equal.
- C. Sealants, Flexible Mastic or Flashing Compound: Compatible with flashing product, approved for use by manufacturer.
- D. Primer: As recommended by flexible flashing manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions under which flexible flashing will be applied, with installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of substrate condition.

3.02 INSTALLATION

- A. Install flexible flashing in strict accordance with manufacturer's written instructions.
- B. Use elastomeric flashing compound compatible with rubberized asphalt at exposed lap joints where water intrusion could occur.
- C. Surface shall be smooth, clean, dry and free of voids or other conditions hindering adhesion or regularity of flashing installation. Clean loose dust or dirt from the surface wherever wall flashing is to be applied by wiping with a clean dry cloth or brush.
 1. Substrates shall be primed in accordance with manufacturer's requirements.
- D. Test surfaces for proper adhesion. Use manufacturer's recommended surface conditioner if substrate or conditions hinder proper adhesion of flashing membrane.
- E. Cut membrane to size and peel release paper from roll to expose rubberized asphalt and

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position against surface. Press firmly into place with a steel hand roller or the back of a utility knife, fully adhering the flashing to the substrate.

- F. Overlap adjacent pieces 2 inches and roll overlap with a steel hand roller.
- G. Rubberized asphalt flashing shall not be applied in areas where it will be exposed to direct sunlight. In all cases, flashing shall be covered within 30 days after installation.
- H. Install flashing at wall in openings in accordance with approved field mockup and in accordance with details.
- I. Ensure that flexible flashing adheres continuously to substrate, and is free from bubbles, fishmouths, creases and other irregularities that affect monolithic adhesion.
- J. Carefully notch and fold flexible flashing at corners and returns. Provide additional overlapping pieces as required for watertight installation.
- K. Provide flexible flashing over building paper at all wall caps.
- L. Cover all flexible flashing with 1 additional layer of Grade D 60 minute building paper at all locations.

END OF SECTION

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SECTION 07 68 00

WEATHER RESISTIVE BARRIER

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Provide spunbond polypropylene fabric combined with 2 plies of 60 minutes, asphalt saturated kraft paper and self-adhesive for vertical walls as required for watertight construction.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 07 46 23 - Wood Siding: Provision of wood siding.
 - 2. Section 07 62 00 - Sheet Metal Flashing and Trim: Provision of sheet metal flashing and trim.
 - 3. Section 07 65 00 - Flexible Flashing: Provision of flexible flashing.
 - 4. Section 08 90 00 - Louvers and Vents: Provision of louvers.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's most current product data and installation instructions, including manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and data for physical and performance properties.
- B. Shop Drawings: Submit Project specific detail of typical and non-typical conditions. Manufacturer's standard details are not acceptable.

1.03 QUALITY ASSURANCE

- A. Qualifications
 - 1. Installer: Engage an experienced installer approved by membrane manufacturer.
- B. Pre-Installation Conference: Conduct conference at the Project site.
 - 1. Include installers of other construction connecting to flashing, such as weather resistive barrier and doors.
 - 2. Review flashing requirements including surface preparation, substrate condition, forecasted weather conditions, special details and sheet flashings, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection
 - 1. Store materials in their original undamaged packages in clean, dry protected location and within temperature range required by flexible flashing membrane manufacturer.
 - 2. Protect stored materials from direct sunlight.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements: Do not apply to moist or damp surfaces.

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PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Drainable Weather Resistive Barrier: Provide 2 layers of 60 minute, Grade "D" asphalt saturated kraft paper over sheet-applied, spunbond polypropylene drainable fabric layer, as manufactured by Henry Company; GE Momentive, or equal.
- B. Flashing at Doors and Vents: As specified in Section 07 65 00.
- C. Crack and Joint Filler: By same manufacturer as drainable weather resistive barrier, "Moistop Sealant".
- D. Air Barrier Sealant for Interior Air Seals at Door Perimeters: By same manufacturer as Drainable Weather Resistive Barriers, "Moistop Sealant".
- E. Wall Flashing: Self-adhesive by same manufacturer as Drainable Weather Resistive Barrier.
- F. Sealants, Flexible Mastic or Flashing Compound: Compatible with flashing product, approved for use by manufacturer.
- G. Primer: As recommended by flexible flashing manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions under which flexible flashing will be applied, with installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of substrate condition.

3.02 INSTALLATION

- A. Install weather resistive barrier and flashing in strict accordance with manufacturer's written instructions.
- B. Install flashing and accessory products prior to weather resistive barrier field membrane.
- C. Surface shall be smooth, clean, dry and free of voids or other conditions hindering adhesion or regularity of flashing installation. Clean loose dust or dirt from the surface wherever wall flashing is to be applied by wiping with a clean dry cloth or brush.
 - 1. Substrates shall be primed in accordance with manufacturer's requirements.
- D. Test surfaces for proper adhesion. Use manufacturer's recommended surface conditioner if substrate or conditions hinder proper adhesion of flashing membrane.
- E. Install flashing at wall in openings in accordance with approved field mockup and in accordance with details.
- F. Avoid raw gypsum panel cut edges. Protect with cured coating of Moistop Sealant, where occurs.

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- G. Apply thick bead of Joint & Seam Filler to all sheathing joints, seams and cracks. Using a dry joint tool, spread 1 inch beyond seam at each side to 20 mils to 30 mils thickness. Spot fastener penetrations, wood knots, deep cracks, or surface irregularities with Joint and Seam filler. Allow to skin before installing other system components.
- H. Rough Openings: Apply a minimum 3/8-inch bead of Moistop Sealant into gaps at sill framing. Allow treated surfaces to skin before installing doors and other flashing or system components. Slope sill framing substrate to shed water.
- I. Roller apply weather resistive barrier at rate recommended by manufacturer to produce a continuous barrier, free of pinholes, voids, and gaps. Allow product to cure in accordance with the manufacturer's installation instructions.
- J. Inspect membrane before covering. Repair any gouges, punctures or damaged areas with additional weather resistive material prior to installing cladding.

END OF SECTION

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SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Provision of joint sealants and backing systems for the following locations:
1. Exterior joints in vertical surfaces as indicated below:
 - a. Control and expansion joints in cast-in-place concrete.
 - b. Perimeter joints between concrete and frames of doors and windows.
 - c. Control and expansion joints in soffit and overhead surfaces.
 - d. Other joints as indicated.
 2. Exterior joints in horizontal traffic surfaces as indicated below:
 - a. Control, expansion and isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:
 - a. Perimeter joints of exterior openings where indicated.
 - b. Tile control and expansion joints.
 - c. Perimeter joints of toilet fixtures.
 - d. Other joints as indicated.
 4. Interior joints in horizontal traffic surfaces as indicated below:
 - a. Control and expansion joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - c. Other joints as indicated.
 5. Acoustical sealant for concealed joints.
 6. Sealer for placement under sill plates.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
1. Section 03 35 00 - Concrete Finishing: For concrete finishes.
 2. Section 07 92 00 - Joint Sealants: Provision of sealants used in concealed perimeter joints of gypsum board partitions to reduce sound transmission.
 3. Section 08 71 00 - Door Hardware: Provision of door hardware.
 4. Section 09 29 00 - Gypsum Board: Provision of gypsum board

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
1. C834 - Standard Specification for Latex Sealants.
 2. C919 - Standard Practice for Use of Sealants in Acoustical Applications.
 3. C920 - Standard Specification for Elastomeric Joint Sealants.
 4. C1193 - Standard Guide for Use of Joint Sealants.
 5. D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
 6. D2240 - Standard Test Method for Rubber Property - Durometer Hardness.
- B. FS - Federal Specifications
1. TT-S-1543 - Sealing Compound: Silicone Rubber Base (For Caulking, Sealing, and Glazing in Buildings and Other Structures).

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1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide joint sealers that have been manufactured to establish and maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

1.04 SUBMITTALS

- A. Product Data: Submit product data from manufacturers for each joint sealant product required.
- B. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
1. Submit samples of all standard colors of sealant which is not paintable.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General Requirements
1. Provide joint sealers compatible with one another and with substrates.
 2. Manufacturer's standard color range shall permit matching sealants to color of contacting surfaces and future ability to paint.
- B. Sealants and Caulks
1. Type A - Urethane Sealant, Single Component
 - a. ASTM C920, Type S, Grade NS, Class 25, Use NT and O.
 - b. Color: As selected by the Architect.
 - c. Manufacturer: Sika Corp., "Sikaflex 1a"; Sonneborn Building Products Division, "NP 1"; BASF, "Master Seal NP 1", or equal.
 2. Type B - Polyurethane Sealant, 2-Component
 - a. ASTM C920, Type M; Grade P; Class 25; Use T having minimum ASTM D2240 Shore A hardness of 30 plus or minus 5.
 - b. Color: As selected by the Architect.
 - c. Manufacturer: Sika Corp., "Sikaflex 2cSL"; Sonneborn Building Products Division; BASF, "Masterseal NP 2 ", or equal.
 3. Type C - Silicone Sealant, Single Component
 - a. FS TT-S-1543, mildew resistant, chemical curing, non-sagging, non-staining, non-bleeding.
 - b. Color: As selected by the Architect.
 - c. Manufacturer: Dow-Corning, "786", or equal.
 4. Type D - Acrylic Emulsion Sealant
 - a. ASTM C834 that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.
 - b. Color: As selected by the Architect.
 - c. Manufacturer: Pecora Corp., "AC-20"; Tremco, Inc., "Tremco Acrylic Latex 834", or equal.
 5. Type E - Acoustical Sealant
 - a. Non-hardening, non-skinning, for use in conjunction with gypsum board.
 - b. Manufacturer: Tremco Manufacturing Co., "Tremco Acoustical Sealant"; Pecora Corp., "BA-98 Acoustical Sealant"; or equal.
 6. Type F - Sill Sealer Gaskets
 - a. Closed-cell neoprene foam, 1/4-inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
 7. Type G - General Purpose Exterior Sealant: MasterSeal, "NP 150", or equal.

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2.02 ACCESSORIES

- A. Primer: Non-staining type recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ASTM D1056 round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width as recommended by manufacturer of sealant material.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.01 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated.
- D. Installation of Sealant Joint Backings: Install sealant joint backings to comply with the following requirements:
 - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture or tear joint fillers.
 - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
 - 2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints for 2 opposing side adhesion only.
- E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 - 1. Provide concave joint configuration per Figure 5A in ASTM C1193, unless otherwise indicated.

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- G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

3.02 SCHEDULE

- A. Type A, Non-Sag
1. Interior and exterior perimeter joints between cast-in-place concrete and frames of doors.
 2. Control and expansion joints in exterior soffits and overhead surfaces.
- B. Type B: Exterior control, expansion and isolation joints in cast-in-place concrete slabs.
- C. Type C
1. Interior ceramic tile control and expansion joints.
 2. Perimeter joints of toilet fixtures.
- D. Type D: All other interior joints not indicated otherwise.
- E. Type E: Concealed acoustical conditions.
- F. Type F: Under sill plates.

END OF SECTION

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SECTION 08 12 10

METAL DOOR FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Provision of exterior non-fire rated metal frames for exterior doors.
- B. Products Installed but not Furnished Under this Section
 - 1. Section 08 71 00 - Door Hardware: Furnishing of finish hardware.
- C. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- D. Related Sections
 - 1. Section 08 14 16 - Flush Wood Doors: Provision of flush wood doors.
 - 2. Section 09 90 00 - Painting and Coating: For field painting primed doors and frames.

1.02 REFERENCES

- A. ANSI - American National Standards Institute
 - 1. A224.1 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- B. ASTM - American Society for Testing and Materials
 - 1. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. A568 - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
 - 3. A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - 4. E336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
 - 5. E2074 - Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
- C. DHI - Door and Hardware Institute
 - 1. RL - Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames.
- D. SDI - Steel Door Institute
 - 1. 100 - Recommended Specifications Standard Steel Doors and Frames.
 - 2. 105 - Recommended Erection Instructions for Steel Frames.
 - 3. 112 - Galvanized Standard Steel Doors and Frames.
 - 4. 117 - Manufacturing Tolerances Standard Steel Doors and Frames.

1.03 SUBMITTALS

- A. Product Data: Submit product data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles and finishes.
- B. Shop Drawings: Submit shop drawings showing fabrication and installation of standard steel doors and frames referenced to the Architect's door mark and hardware group. Include details of each frame type, elevations of door design types, conditions at openings,

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details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

1. Provide schedule of doors and frames using same reference numbers for details and openings as those on the Contract Drawings.
2. Indicate coordinate of glazing frames and stops with glass and glazing requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Acceptance at Site
1. Deliver frames cardboard-wrapped or crated to provide protection during transit and job storage.
 2. Inspect frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the Architect; otherwise, remove and replace damaged items as directed.
- B. Storage and Protection: Store frames at building site under cover. Place units on minimum 4 inches high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4-inch spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Ceco Door Products; Republic Builders Products; Steelcraft Manufacturing Co., or equal.

2.02 MATERIALS

- A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A568.
- B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A568.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, hot dipped galvanized in accordance with ASTM A924 with A60 or G60 coating designation, mil phosphatized.
- D. Supports and Anchors: Fabricate of not less than 18 gauge sheet steel; galvanized where used with galvanized frames.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built in at exterior walls, hot-dip galvanize in compliance with ASTM A153, Class C or D as applicable.
- F. Shop Applied Paint: Apply after fabrication.
1. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints complying with ANSI A224.1.
- G. Finish: As specified in Section 09 90 00.
- H. Frames
1. Provide metal frames for doors of types and styles as indicated on the Drawings and schedules. Conceal fastenings, unless otherwise indicated.

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2. Door Silencers: Except on weatherstripped and smoke gasketed frames, drill stops to receive 3 silencers on strike jambs of single door frames.

G. Hardware: As specified in Section 08 71 00.

2.03 FABRICATION

- A. Fabricate steel frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at Project site. Comply with SDI 100 requirements.
 1. Internal Construction: Manufacturer's standard vertical steel stiffeners or unitized steel grid with internal sound deadener on inside of face sheets in accordance with SDI standards.
 2. Clearances: Not more than 1/8-inch at jambs and heads except between non-fire rated pairs of doors not more than 1/4-inch. Not more than 3/4-inch at bottom.
- B. Tolerances: Comply with SDI 117.
- C. Fabricate frames, concealed stiffeners, reinforcement, edge channels and moldings from either cold-rolled or hot-rolled steel.
- D. Fabricate exterior frames from galvanized sheet steel in accordance with SDI 112.
- E. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- F. Hardware Preparation: Prepare frames to receive mortised and concealed hardware in accordance with final Door Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Series Specifications for frame preparation for hardware.
- G. Reinforce frames to receive surface applied hardware. Drilling and tapping for surface applied hardware may be done at the Project site.
- H. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with DHI RL.
- I. Shop Painting: Clean, treat and paint exposed surfaces of steel door frame units, including galvanized surfaces.
 1. Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before application of paint.
 2. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

2.04 FINISHES

- A. Finish Painting: As specified in Section 09 90 00.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install steel door frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.

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- B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated.
 - 1. Place frames prior to construction of enclosing walls. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

3.02 ADJUST AND CLEAN

- A. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Final Adjustments: Check and readjust operating hardware items, leaving doors and frames undamaged and in complete and proper operating condition.

END OF SECTION

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SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Provision of non-fire rated resistance rated flush solid core doors.
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions of Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 08 71 00 - Door Hardware: Provision of door hardware.
 - 2. Section 09 90 00 - Painting and Coating: For finish painting.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
- B. Shop Drawings: Submit shop drawings indicating location and size of each door referenced to the Architect's door mark and hardware group, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.
 - 1. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.

1.03 QUALITY ASSURANCE

- A. Quality Standard: NWWDA Quality Standard: I.S.1-A.

1.04 WARRANTY

- A. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4-inch in a 42 inch by 84 inch section or that show telegraphing of core construction in face veneers exceeding 0.01inch in a 3 inch span, or do not conform to tolerance limitations of referenced quality standards.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.
 - 2. Warranty shall be in effect during the following period of time after date of Substantial Completion, Beneficial Occupancy or Notice of Completion, whichever is earlier.
 - a. Solid Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Algoma Hardwoods, Inc.; Eggers Industries, Architectural Door Division; Marshfield Door Systems, Inc., or equal.

2.02 MATERIALS

- A. Exterior Solid Core Doors for Opaque Finish
 - 1. Faces: Birch or Luan.

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2. Grade: Custom.
3. Construction: Hardboard faces glued directly to core.
4. Core: Particleboard core.

B. Hardware: As specified in Section 08 71 00.

2.03 FABRICATION

- A. Fabricate flush wood doors to comply with the following requirements: Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI WDHS3. Comply with final hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware templates.
1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.

2.04 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime exposed portions of doors for paint finish with 1 coat of wood primer specified in Section 09 90 00.

2.05 FINISHES

- A. Opaque Finish: As specified in Section 09 90 00.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and referenced quality standard and as indicated.
- B. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire rated doors. Seal cut surfaces after fitting.
1. Fitting Clearances for Non-Fire Rated Doors: Provide 1/8-inch at jambs and heads; 1/16-inch per leaf at meeting stiles for pairs of doors, and 1/8-inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch clearance from bottom of door to top of threshold.
 2. Bevel non-fire rated doors 1/8-inch in 2 inches at lock and hinge edges.

3.02 ADJUSTING AND PROTECTION

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion.

END OF SECTION

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SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Provision of access doors and frames.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 09 90 00 - Painting and Coating: For finish painting.
 - 2. Division 22 - Plumbing: For coordination of installation requirements.
 - 3. Division 26 - Electrical: For coordination of installation requirements.

1.02 REFERENCES

- A. CBC - California Building Code, 2019 Edition

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's data completely describing products.
- B. Shop Drawings: Submit drawings showing attachment to structure in each typical condition.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Nystrom; Milcor, Inc.; Karp Associates, Inc., or equal.

2.02 MATERIALS

- A. Non-Fire Rated
 - 1. Type 1
 - a. Flush steel door and flanged frame for gypsum board walls and ceiling installations.
 - b. Size: As indicated.
 - c. Manufacturer: Milcor, Inc., "Model DW"; Karp Associates, Inc., "DSC-214M", or equal.
 - 2. Type 2: Flush steel door and flanged frame for tile installations.
 - a. Manufacturer: Milcor, Inc., "Model M"; J. L. Industries, "Model TM", or equal.
 - 3. Type 3: Flush stainless steel door and flanged frame for tile and gypsum board installations where finish material is ceramic tile.
 - a. Manufacturer: Milcor, Inc., "Model MS"; Karp Associates, Inc., "DSC-214M Stainless Steel", or equal.
 - 4. Type 4: Flush 14 gauge, primed steel door and flanged frame for concrete masonry unit walls.
 - a. Manufacturer: Milcor, Inc., "Model M"; Karp Associates, Inc., or equal.

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- B. Fire Rated Attic Access at Top Floor Units Only
 - 1. Provide minimum 22 inches by 30 inches in accordance with CBC 1505.1 with minimum 1 hour ceiling panel rating. Provide automatic closing.
 - a. Manufacturer: Nystrom Products, Co., "MPLS. MN Series ITK2230", or equal.

- C. Finishes
 - 1. Steel: Chemically etch and apply baked-on rust inhibitive zinc dust prime coat.
 - 2. Stainless Steel: Reviewed manufacturer's #4 finish.
 - 3. Finish Painting: As specified in Section 09 90 00.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install access doors in accordance with manufacturer's instructions and at locations authorized by the Architect in accordance with requirements for work of Divisions 22 and 26.

- B. Securely attach frames to supporting work and ensure doors operate smoothly and are free from warp, twist and distortion.

3.02 ADJUSTING AND CLEANING

- A. Thoroughly clean surfaces of grease, oil, or other impurities, touch-up abraded prime coat, and otherwise prepare for finish painting where required.

END OF SECTION

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SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions of Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following, but is not necessarily limited to:
 - 1. Door Hardware, including electric hardware.
 - 2. Storefront and Entrance door hardware.
 - 3. Gate Hardware.
 - 4. Power supplies for electric hardware.
 - 5. Low-energy door operators plus sensors and actuators.
 - 6. Thresholds, gasketing and weather-stripping.
 - 7. Door silencers or mutes.
- C. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
 - 1. Division 8: Section - Steel Doors and Frames.
 - 2. Division 8: Section - Wood Doors.
 - 3. Division 8: Section - Aluminum Storefront
 - 4. Division 28: Section - Fire/Life-Safety Systems & Security Access Systems.

1.03 REFERENCES (USE DATE OF STANDARD IN EFFECT AS OF BID DATE.)

- A. 2016 California Building Code, CCR, Title 24.
- B. BHMA – Builders' Hardware Manufacturers Association
- C. DHI – Door and Hardware Institute
- D. NFPA - National Fire Protection Association.
 - 1. NFPA 80 - Fire Doors and Other Opening Protectives
 - 2. NFPA 105 - Smoke and Draft Control Door Assemblies
- E. UL - Underwriters Laboratories.
 - 1. UL 10C - Fire Tests of Door Assemblies
 - 2. UL 305 - Panic Hardware
- F. WHI - Warnock Hersey Incorporated
- G. SDI - Steel Door Institute

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1.04 SUBMITTALS & SUBSTITUTIONS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Submit six (6) copies of schedule organized vertically into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
 - 1. Include a Cover Sheet with;
 - a. Job Name, location, telephone number.
 - b. Architects name, location and telephone number.
 - c. Contractors name, location, telephone number and job number.
 - d. Suppliers name, location, telephone number and job number.
 - e. Hardware consultant's name, location and telephone number.
 - 2. Job Index information included;
 - a. Numerical door number index including; door number, hardware heading number and page number.
 - b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
 - c. Manufacturers' names and abbreviations for all materials.
 - d. Explanation of abbreviations, symbols, and codes used in the schedule.
 - e. Mounting locations for hardware.
 - f. Clarification statements or questions.
 - g. Catalog cuts and manufacturer's technical data and instructions.
 - 3. Vertical schedule format sample:

Heading Number 1 (Hardware group or set number – HW -1)					
			(a) 1 Single Door #1 - Exterior from Corridor 101	(b) 90°	(c) RH
			(d) 3' 0"x7' 0" x 1-3/4" x (e) 20 Minute (f) WD x HM		
(g) 1	(h)	(i) ea	(j) Hinges - (k) 5BB1HW 4.5 x 4.5 NRP (l) ½ TMS	(m) 626	(n) IVE
2	6AA	1 ea	Lockset - ND50PD x RHO x RH x 10-025 x JTMS	626	SCH

(a) - Single or pair with opening number and location. (b) - Degree of opening (c) - Hand of door(s) (d) - Door and frame dimensions and door thickness. (e) - Label requirements if any. (f) - Door by frame material. (g) - (Optional) Hardware item line #. (h) - Keyset Symbol. (i) - Quantity. (j) - Product description. (k) - Product Number. (l) - Fastenings and other pertinent information. (m) - Hardware finish codes per ANSI A156.18. (n) - Manufacture abbreviation.

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- D. Make substitution requests in accordance with Division 1. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.
- E. Wiring Diagrams: Provide product data and wiring and riser diagrams for all electrical products listed in the Hardware Schedule portion of this section.
- F. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- G. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- H. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.
- I. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.

1.05 QUALITY ASSURANCE

- A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
 - 1. Responsible for detailing, scheduling and ordering of finish hardware.
 - 2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
 - 3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.
- C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.
- D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
 - 1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
- E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

1.06 DELIVERY, STORAGE AND HANDLING

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- A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.
- B. Hardware items shall be individually packaged in manufacturers' original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.
- C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.
- D. Contractor to inventory door hardware jointly with representatives of hardware supplier and hardware installer until each all are satisfied that count is correct.

1.07 WARRANTY

- A. Provide warranties of respective manufacturers' regular terms of sale from day of final acceptance as follows:
 - 1. Locksets: "L" Series (3) years – "ND" Ten (10) years.
 - 2. Electronic: One (1) year.
 - 3. Closers: Thirty (30) years – except electronic closers shall be two (2) years.
 - 4. Exit devices: Three (3) years.
 - 5. All other hardware: Two (2) years.

1.08 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.09 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference at least one week prior to beginning work of this section.
- B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key District Personnel, and Project Inspector.
- C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review District's keying standards.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

<u>Item</u>	<u>Manufacturer</u>	<u>Acceptable Substitutes</u>
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches Cylinders	Schlage	Or Approved Equal
Exit Devices	Von Duprin	Or Approved Equal
Closers	LCN	Or Approved Equal

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Push, Pulls		
Protection Plates	Ives	Trimco, BBW, DCI
Flush Bolts	Ives	Trimco, BBW, DCI
Dust Proof Strikes	Ives	Trimco, BBW, DCI
Coordinators	Ives	Trimco, BBW, DCI
Stops	Ives	Trimco, BBW, DCI
Overhead Stops	Glynn-Johnson	Or Approved Equal
Thresholds	Zero	Pemko, National Guard
Seals & Bottoms	Zero	Pemko, National Guard

2.02 MATERIALS

- A. Hinges: Exterior out-swinging door butts shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.
 - 1. Hinges shall be sized in accordance with the following:
 - a. Height:
 - 1) Doors up to 42" wide: 4-1/2" inches.
 - 2) Doors 43" to 48" wide: 5 inches.
 - b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
 - c. Number of Hinges: Furnish 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.
 - 2. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.
- B. Continuous Hinges: As manufactured by Ives, an Allegion Company. UL rated as required.
- C. Heavy Duty Cylindrical Locks and Latches: Schlage "ND" Series as scheduled with "Sparta" design, fastened with through-bolts and threaded chassis hubs.
 - 1. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
 - a. Abusive Locked Lever Torque Test – minimum 3,100 inch-pounds without gaining access
 - b. Offset lever pull – minimum 1,600 foot pounds without gaining access
 - c. Vertical lever impact – minimum 100 impacts without gaining access
 - 2. Cycle life - tested to minimum 16 million cycles per ANSI/BHMA A156.2 Cycle Test with no visible lever sag or use of performance aids such as set screws or spacers
 - 3. UL 10C for 4'-0" x 10'-0" 3-hour fire door.
 - 4. Cylinders: Refer to "KEYING" article, herein.
 - 5. Provide solid steel anti-rotation through bolts and posts to control excessive rotation of lever.
 - 6. Provide lockset that allows lock function to be changed to over twenty other common functions by swapping easily accessible parts.
 - 7. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw capable of UL listing of 3 hours on a 4' x 10' opening. Provide proper latch throw for UL listing at pairs.

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8. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
 9. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
 10. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 11. Provide wired electrified options as scheduled in the hardware sets.
 - a. 12 through 24 volt DC operating capability, auto-detecting
 - b. Selectable EL (fail safe)/EU (fail secure) operating mode via switch on chassis
 - c. 0.230A (230mA) maximum current draw
 - d. 0.010A (10mA) holding current
 - e. Modular / "plug in" request to exit switch
 12. Lever Trim: Solid cast levers without plastic inserts, and wrought roses on both sides.
- D. Exit devices: Von Duprin as scheduled.
1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 2001 standards.
 2. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
 3. Mechanism case shall have an average thickness of .140".
 4. Compression spring engineering.
 5. Non-handed basic device design with center case interchangeable with all functions.
 6. All devices shall have quiet return fluid dampeners.
 7. All latchbolts shall be deadlocking with $\frac{3}{4}$ " throw and have a self-lubricating coating to reduce friction and wear.
 8. Device shall bear UL label for fire and or panic as may be required.
 9. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
 10. All Exit Devices to be sex-bolted to the doors.
 11. Panic Hardware shall comply with CBC Section 11B.404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.
 - a. Provide exit devices UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.4, and UL listed for Panic Exterior Fire Exit Hardware.
- E. Closers: LCN as scheduled. Place closers inside building, stairs, room, etc.
1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
 2. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
 3. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16" steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.
 4. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.
 5. Closers shall be installed to permit doors to swing 180 degrees.
 6. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.

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7. Provide the manufactures drop plates, brackets and spacers as required at narrow head rails and special frame conditions. NO wood plates or spacers will be allowed.
 8. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. Per 11B-404.2.8.1, door shall take at least 5 seconds to move from an open position of 90 degrees to a position of 12 degrees from the latch jamb.
- F. Flush Bolts & Dust Proof Strikes: Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
1. Manual flush bolts only permitted on storage or mechanical openings as scheduled.
 2. Provide dust proof strikes at openings using bottom bolts.
- G. Door Stops:
1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
 2. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).
 3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- H. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10" high and 2" LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.
- I. Thresholds: As Scheduled and per details.
1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope.
 2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 "Thermal and Moisture Protection".
 3. Use 1/4" fasteners, red-head flat-head sleeve anchors (SS/FHSL).
 4. Thresholds shall comply with CBC Section 11B-404.2.5.
- J. Seals: Provide silicone gasket at all rated and exterior doors.
1. Fire-rated Doors, Resilient Seals: UL10C Classified complies with NFPA 80 & NFPA 252. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements.
 2. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C Classified complies with NFPA 80 & NFPA 252. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required.
 3. Smoke & Draft Control Doors, Provide UL10C Classified complies with NFPA 80 & NFPA 252 for use on "S" labeled Positive Pressure door assemblies.
- K. Door Shoes & Door Top Caps: Provide door shoes at all exterior wood doors and top caps at all exterior out-swing doors.

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- L. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.03 KEYING

- A. Furnish a masterkey system as directed by the owner or architect. .
- B. A detailed keying schedule is to be prepared by the owner and/or architect in consultation with a representative of the lock manufacturer. Each keyed cylinder on every keyed lock is to be listed separately showing the door #, key group (in BHMA terminology), cylinder type, finish and location on the door.
- C. Extend the original Schlage masterkey system.
- D. Furnish all cylinders in the Schlage conventional style except the exit device and removable mullion cylinders which will be supplied in Schlage Full Size Interchangeable Core (FSIC). Pack change keys independently (PKI).
- E. Furnish construction keying for doors requiring locking during construction.
- F. Furnish mechanical keys as follows:
 - 1. Furnish 2 cut change keys for each different change key code.
 - 2. Furnish 1 uncut key blank for each change key code.
 - 3. Furnish 6 cut masterkeys for each different masterkey set.
 - 4. Furnish 3 uncut key blanks for each masterkey set.
 - 5. Furnish 2 cut control keys cut to the top masterkey for permanent I/C cylinders.
 - 6. Furnish 1 cut control key cut to each SKD combination.
- G. Furnish Schlage Padlocks and the cylinders to tie them into the masterkey system for gates, storage boxes, utility valve security, roof hatches and roll-up doors keyed as directed in the keying schedule.

2.04 FINISHES

- A. Generally to be satin chrome US26D (626 on bronze and 652 on steel) unless otherwise noted.
- B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless otherwise noted.
- C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
- D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.05 FASTENERS

- A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
- B. Screws for butt hinges shall be flathead, countersunk, full-thread type.
- C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.

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- D. Provide expansion anchors for attaching hardware items to concrete or masonry.
- E. All exposed fasteners shall have a phillips head.
- F. Finish of exposed screws to match surface finish of hardware or other adjacent work.
- G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.
- C. Fire-Rated Door Assembly Inspection: Upon completion of the installation, all fire door assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturer's furnished fasteners are used for installation and that it meets all criteria of a fire door assembly per NFPA 80 (Standard for Fire Doors and Other Opening Protectives) 2013 Edition. A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The inspection of the swinging fire doors shall be performed by a certified FDAI (Fire Door Assembly Inspector) with knowledge and understanding of the operating components of the type of door being subjected to the inspection. The record shall list each fire door assembly throughout the project and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- B. Use the templates provided by hardware item manufacturer.
- C. Mounting heights for hardware shall be as recommended by the Door and Hardware Institute. Operating hardware will to be located between 34" and 44" AFF.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in full bed of butyl-rubber sealant.
- G. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.
- H. Hardware Installer shall coordinate with security contractor to route cable to connect electrified locks, panic hardware and fire exit hardware to power transfers or electric hinges at the time these items are installed so as to avoid disassembly and reinstallation of hardware.

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- I. Hardware Installer shall also be present with the security contractor when the power is turned on for the testing of the electronic hardware applications. Installer shall make adjustments to solenoids, latches, vertical rods and closers to insure proper and secure operation.
- J. All wiring for electro-mechanical hardware mounted on the door shall be connected through the power transfer and terminated in the interface junction box specified for in the Electrical Section.
- K. Conductors shall be minimum 18 gage stranded, multicolored. A minimum 12 in. loop of conductors shall be coiled in the interface junction box. Each conductor shall be permanently marked with its function.
- L. If a power supply is specified in the hardware sets, all conductors shall be terminated in the power supply. Make all connections required for proper operation between the power supply and the electro-mechanical hardware. Provide the proper size conductors as specified in the manufacturer's technical documentation.

3.03 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surface soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.04 HARDWARE LOCATIONS

- A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

3.05 FIELD QUALITY CONTROL

- A. Contractor is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturers' instructions and as specified herein.

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3.06 SCHEDULE

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for examining the Plans and Specifications and furnishing proper hardware for all openings whether listed or not. If there are any omissions in hardware groups in regard to regular doors they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.
- C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

Manufacturers Abbreviations (Mfr.)

ADA	=	Adams Rite Mfg.	Aluminum Door Hardware
GLY	=	Glynn-Johnson Corporation	Overhead Door Stops
IVE	=	Ives	Hinges, Pivots, Bolts, Coordinators, Dust Proof Strikes, Push Pull & Kick Plates, Door Stops & Silencers
LCN	=	LCN	Door Closers
SCE	=	Schlage Electronics	Electronic Door Components
SCH	=	Schlage Lock Company	Locks, Latches & Cylinders
VON	=	Von Duprin	Exit Devices
ZER	=	Zero International	Thresholds, Gasketing & Weather-stripping

HARDWARE GROUP NO. 01

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD SPA	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188S-BK	S-BK	ZER

HARDWARE GROUP NO. 02

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FLOOR STOP	FS439	682	IVE
1	EA	GASKETING	188S-BK	S-BK	ZER

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END OF SECTION

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SECTION 08 83 00

MIRRORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Glass mirrors.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
 - 1. C1036 - Standard Specification for Flat Glass.
- B. GANA - Glass Association of North America
 - 1. Glazing Manual.
- C. NAMM - National Association of Mirror Manufacturers

1.03 SUBMITTALS

- A. Samples: Submit samples, 12 inches square in size, of mirrored glass specified, including edge treatment on 2 adjoining edges of samples.

1.04 QUALITY ASSURANCE

- A. Glazing Standards: Comply with recommendations of GANA "Glazing Manual" except where more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or referenced standards.
- B. Mirror Manufacturers' Document: Comply with recommendations of NAMM in its publication "MIRRORS, Handle with Extreme Care, Tips for the Professional on the Care and Handling of Mirrors".

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's instructions for shipping, storing, and handling mirrored glass; avoid deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.06 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with mirrored glass installation until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: As selected by the Architect.

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2.02 GLASS FOR MIRROR PRODUCTION

- A. Mirror Glass: Nominal 0.23-inch thick, conforming to ASTM C1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
- B. Mirror Sizes: After application of glass coating, cut mirrored glass to final sizes with nominal glass thickness of 3/16-inch.
 - 1. Size as indicated on the Drawings.
- C. Mirror Edge Treatment
 - 1. Flat polished edge.
 - 2. Perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.03 MISCELLANEOUS MATERIALS

- A. Custom Channel: Stainless steel, AISI Type 302/304, with polished No. 4 finish, 22 gauge minimum thickness, unless otherwise indicated.
- B. Setting Blocks: Neoprene, 70 - 90 Shore A hardness.
- C. Edge Sealer: A coating that has proven to be compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirror edges.
- D. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors by spot application, certified as compatible with glass coating by organic protective coating manufacturer; approved by mirror manufacturer, with maximum 70 g/l VOC.
- E. Mirror Hardware: Extruded aluminum mirror hardware, of size and profile indicated, in manufacturer's standard finish, complying with description below:
 - 1. Clear polished finish.
- F. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture.
- G. Anchors and Inserts: Provide devices as required for installation of mirror hardware.

PART 3 - EXECUTION

3.01 GLAZING

- A. General: Install mirrors to comply with printed directions of mirror manufacturer. Mount mirrors in place to avoid distorting reflected images and provide space for air circulation between back of mirror and face of mounting surface.
- B. Mastic Spot Installation System
 - 1. Identify and examine surfaces over which mirror is to be mounted. Comply with manufacturer's printed installation directions for preparation of mounting surfaces including coating surfaces with mastic manufacturer's special bond coating where applicable.
 - 2. Apply barrier coat to mirror backing where approved by manufacturers of mirror and backing material.
 - 3. Apply mastic in spots to comply with mastic manufacturer's printed directions for coverage and to allow air circulation between back of mirror and face of mounting surface.
 - 4. After mastic is applied, align mirror and press into place while maintaining a minimum air space of 3/16-inch between back of mirror and mounting surface.

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5. Install permanent means of support at bottom and top edges with bottom support designed to withstand mirror weight and top support to prevent mirror from coming away from wall along top edges.
 - a. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable.
 - b. For continuous bottom supports, provide 1/8-inch by 4 inch setting blocks at quarter points. For channels or other continuous supports in which water could be trapped, provide two 1/4-inch diameter weeps drilled between setting blocks.
 - c. Provide clips along top of mirror.

3.02 PROTECTION AND CLEANING

- A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirror to be exposed to standing water.
- C. Maintain environmental conditions that will prevent mirror from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Wash mirrors not more than 4 days prior to date scheduled for inspections intended to establish date for Substantial Completion. Wash glass by methods recommended in NAMM document and by mirrored glass manufacturer. Use water or glass cleaners free from substances capable of damaging mirror edges or glass coating.

END OF SECTION

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SECTION 08 91 19

FIXED LOUVERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Fixed extruded aluminum louvers, L01 and L02.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 07 65 00 - Flexible Flashing: Provision of flexible flashing.
 - 2. Section 07 92 00 - Joint Sealants: Provision of sealers and caulks.

1.02 REFERENCES

- A. AMCA - Air Movement and Control Association
 - 1. 500 - Test Methods for Louvers, Dampers.
 - 2. 501 - Application Manual for Air Louvers.
- B. ASTM - American Society for Testing and Materials
 - 1. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. B211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
- C. AWS - American Welding Society
 - 1. D1.2 - Structural Welding Code - Aluminum.
- D. CBC - California Building Code, 2019 Edition
- E. NAAMM - National Association of Architectural Metal Manufacturers
 - 1. MFM - Metal Finishes Manual.
- F. SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc.
 - 1. Architectural Sheet Metal Manual.
- G. SSPC - The Society for Protective Coatings
 - 1. Paint 12 - Paint Specification No. 12: Cold-Applied Asphalt Mastic (Extra Thick Film).

1.03 DEFINITIONS

- A. Louver Terminology: Refer to AMCA 501 for definitions of terms for metal louvers not otherwise defined in this Section or in referenced standards.

1.04 SYSTEM DESCRIPTION

- A. Performance Requirements
 - 1. Structural Performance: Engineer, fabricate and install fixed exterior metal wall louvers to withstand the effects of loads and stresses from wind and normal thermal movement without evidencing permanent deformation of louver components including blades, frames, and supports; noise or metal fatigue caused by louver blade rattle or flutter; or permanent damage to fasteners and anchors.

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2. Wind Load: Design and size members to withstand dead loads and live loads caused by pressure and suction of wind for design pressure in pounds per square foot in accordance with CBC and the following:
 - a. Exposure: B.
 - b. Wind Speed in Miles Per Hour: 100.
3. Normal thermal movement is defined as that resulting from the following maximum change (range) in ambient temperature. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
 - a. Temperature Change (Range): 120 degrees Fahrenheit ambient, 180 degrees Fahrenheit material surfaces.
4. Air-Performance, Water-Penetration, and Air-Leakage Ratings: Provide louvers complying with performance requirements indicated as demonstrated by testing manufacturer's stock units of height and width indicated. Test units according to AMCA 500.
 - a. Perform testing on unpainted, cleaned, degreased units.
 - b. Perform water-penetration testing on louvers without screens.
 - c. Equivalent Air-Performance Ratings: Louvers having less free area than that specified or having a lower free area velocity at the static pressure loss specified may be considered for the Work provided their total air performance is equivalent to that specified. The burden of proof of equivalency is on the Contractor. For louvers to be considered equivalent, the product of their free area, for the size specified, and their free area velocity at the static pressure loss specified must be at least equal to the product of the specified free area and velocity. Also, their free area velocity at the static pressure loss specified must not result in water penetration of more than 0.01 ounce per square foot of free area, and they must meet all other requirements.
5. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions. See Structural Drawings for spectral response acceleration, short period (Sds).
 - a. Component Importance Factor: 1.5.
6. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each type of product specified.
- B. Quality Control Submittals
 1. Test Reports: Submit product test reports evidencing compliance of units with performance requirements indicated.
 2. Certificates: Submit product certificates signed by louver manufacturers certifying that their products comply with the specified requirements and are licensed to bear the AMCA seal based on tests made according to AMCA 500 and complying with the AMCA Certified Ratings Program.

1.06 QUALITY ASSURANCE

- A. Welding Standards: Comply with applicable provisions of AWS D1.2.
 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- B. Engineer Qualifications: California licensed professional engineer and experienced in providing engineering services of the kind indicated that have resulted in the installation of louvers similar to this Project in material, design and extent and that have a record of successful in-service performance.

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- C. SMACNA Standard: Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Check actual louver openings by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Where field measurements cannot be made without delaying the Work, guarantee opening dimensions and proceed with fabricating louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Greenheck, "ESK-402"; Airolite Co., or equal.

2.02 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
 - 1. Sheet and Plate: ASTM B209.
 - 2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B221.
- B. Fasteners: Of same basic metal and alloy as fastened metal or 300 series stainless steel, unless otherwise indicated. Do not use metals that are corrosive or incompatible with joined materials.
 - 1. Use types and sizes to suit unit installation conditions.
 - 2. Use Phillips flat-head screws for exposed fasteners, unless otherwise indicated.
- C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC Paint 12 except containing no asbestos fibers.
- D. Flexible Flashing: As specified in Section 07 65 00.

2.03 FABRICATION

- A. General: Fabricate louvers to comply with requirements indicated for design, dimensions, materials, joinery, and performance.
- B. Assemble louvers in shop to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- D. Maintain equal louver blade spacing to produce uniform appearance.
- E. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances of louvers, adjoining construction and perimeter sealant joints.
- F. Include supports, anchorages and accessories required for complete assembly.

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- G. Provide vertical mullions of type and at spacings indicated but not more than recommended by manufacturer, or 72 inches on center, whichever is less. At horizontal joints between louver units, provide horizontal mullions except where continuous vertical assemblies are indicated.
- H. Provide sill extensions and loose sills made of same material as louvers where indicated or required for drainage to exterior and to prevent water penetrating to interior.
- I. Join frame members to one another and to fixed louver blades as follows, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary:
 - 1. With fillet welds, concealed from view.
 - 2. With fillet welds, concealed from view; or mechanical fasteners; or a combination of these methods; as standard with louver manufacturer.

2.04 FIXED WALL LOUVERS

- A. Horizontal, Drainable, Fixed-Blade Louvers: Aluminum frames and louver blades, designed to collect and drain water to exterior at sill by means of gutters in front edges of blades and channels in jambs and mullions, complying with the following requirements:
 - 1. Louver Depth: 1 inch, unless otherwise indicated.
 - 2. Louver Size: As indicated.
 - 3. Frame Thickness: 0.125-inch, unless otherwise indicated.
 - 4. Blade Thickness: 0.125-inch, unless otherwise indicated.
 - 5. Blade Angle: 45 degrees, unless otherwise indicated.
 - 6. Provide rainwater scoop at attic side.
 - 7. Provide louver frame with nailing flange.

2.05 SCREENS

- A. General: Provide each exterior aluminum louver with screens complying with the following requirements:
 - 1. Screen Location for Fixed Louvers: Interior face, unless otherwise indicated.
 - 2. Insect Screening Type: Stainless steel, 18 by 18 mesh, 0.009-inch wire.
- B. Secure screens to louver frames with stainless steel machine screws, spaced 6 inches maximum from each corner and at 12 inches on center between.

2.06 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to application and designations of finishes.
- B. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - 1. Color: As selected by the Engineer.
 - 2. Product: Kynar, or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Locate and place louver units plumb, level, and at indicated alignment with adjacent work.

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Install weather-lapped into building paper coursing at wall installations with flexible flashing comparable to window installations as detailed in Construction Documents.

- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering and grinding operations required for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return items that cannot be refinished in the field to the shop, make required alterations and refinish entire unit, or provide new units.
- F. Protect nonferrous metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry or dissimilar metals.
- G. Install concealed gaskets, flashings, joint fillers and insulation, as louver installation progresses, where required to make louver joints weathertight. Comply with Section 07 92 00 for sealants applied during installation of louver.

3.02 ADJUSTING AND PROTECTION

- A. Protect louvers from damage of any kind during construction period including use of temporary protective coverings where needed and approved by louver manufacturer. Remove protective covering at time of Substantial Completion.
- B. Restore louvers damaged during installation and construction period, so that no evidence remains of correction work. If results of restoration are unsuccessful, as judged by the Engineer, remove damaged units and replace with new units at o additional cost to the District.
 - 1. Clean and touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

3.03 CLEANING

- A. Periodically clean exposed surfaces of louvers that are not protected by temporary covering to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Rinse surfaces thoroughly and dry.

END OF SECTION

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SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Gypsum board screw attached to wood framing and furring members, joint treatment and accessories.
 - 2. Installation of sound deadening insulation in plumbing shaft, including acoustical sealant.
 - 3. Gypsum sheathing.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 06 10 00 - Rough Carpentry: Provision of wood framing.
 - 2. Section 07 92 00 - Joint Sealants: Provision of caulking and sealants.
 - 3. Section 09 90 00 - Painting and Coating: For finish painting.

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
 - 1. C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - 2. C514 - Standard Specification for Nails for the Application of Gypsum Board.
 - 3. C840 - Standard Specification for Application and Finishing of Gypsum Board.
 - 4. C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - 5. C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - 6. C1178 - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
 - 7. C1396 - Standard Specification for Gypsum Board.
 - 8. C1658 - Standard Specification for Glass Mat Gypsum Panels.
 - 9. E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- B. CBC - California Building Code, 2019 Edition
- C. GA - Gypsum Association
 - 1. 201 - Using Gypsum Board for Walls and Ceilings.
 - 2. 214 - Recommended Levels of Gypsum Board Finish.
 - 3. 216 - Application and Finishing of Gypsum Panel Products.
 - 4. 253 - Application of Gypsum Sheathing.
 - 5. 600 - Fire Resistance Design Manual.
- D. UL - Underwriters Laboratories Inc.
 - 1. FRD - Fire Resistance Directory.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data. Include the following:

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1. Fire Resistance Data: Include required fire test results for gypsum board systems on partitions and ceilings.
2. Sound Transmission Data: Include certified evidence that installed gypsum board systems and materials meet required STC levels.

1.04 QUALITY ASSURANCE

- A. Fire Test Response Characteristics: Where fire resistance rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:
1. Fire Resistance Ratings: As indicated by GA File Numbers in GA 600 or design designations in UL FRD or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: United States Gypsum Co.; Gold Bond Building Products Div., National Gypsum Co.; Pacific Coast Building Products, Pabco Gypsum Division, or equal.

2.02 MATERIALS

- A. Gypsum Board Types
1. Type 1 - Typical for Rated Assemblies: Fire rated board for fire resistance rated assemblies, ASTM C1396, Type X, tapered edges, 48 inches wide, 5/8-inch thick, unless otherwise required by fire resistance rated assembly indicated on the Drawings.
 2. Type 2 - Rated, Pre-Rock Applications and Where Mildew-Resistance is Required: Fire rated, mold-proof, 5/8-inch thick, as manufactured by Georgia Pacific, "DensArmor Plus High Performance Interior Panels", or equal.
- B. Cementitious Backer Board Sheathing: Silicone treated gypsum core, surfaced with inorganic glass mats and gold color alkali resistant surface coating, 5/8-inch thick, as manufactured by Georgia Pacific, "DensGlass", or equal.
1. Provide at exterior conditions for other pre-rock conditions open to the weather.
 2. Provide as a substrate for cement plaster soffits.
- C. Screws: ASTM C1002. Machine thread for gypsum board to metal attachments.
- D. Insulation: As specified in Section 07 21 10.
- E. Accessories
1. Corner Beads and Casing Beads: ASTM C1047, sheet steel zinc coated by hot-dip process. Use square corner beads at all wall and ceiling outside corners.
 2. Resilient Furring Channels: Deluxe type, 3/8-inch deep members designed to reduce sound transmission.
 - a. Configuration: Z-shaped, with face attached to 1 flange by slotted or expanded metal legs.
- F. Joint Treatment Materials: Products of one manufacturer conforming to ASTM C475, ASTM C840 and recommendations of manufacturer of both gypsum board and joint treatment materials for application indicated. Conform to GA 201 and GA 216 for

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reinforcing tape, joint compound and water.

1. Joint Tape
 - a. Cross-laminated, tapered edge, reinforced paper or fiber glass mesh tape as recommended by setting type joint compound manufacturer.
 - b. For silicone treated gypsum backer board, use 2 inch wide, 10 x 10 woven glass mesh tape.
2. Setting Type Joint Compound: Factory prepackaged, job mixed, chemical hardening powder products formulated for uses indicated or factory premixed product. Use hot type at exterior gypsum soffits.

G. Acoustical Sealant: As specified in Section 07 92 00.

2.03 FINISHES

- A. Levels of Gypsum Board Finish as Defined by GA 214. Levels are only examples and do not constitute a schedule of finish. See Interior Finish Schedule for levels of finish.
1. Level 0: No taping, finishing, or accessories required.
 2. Level 1: All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
 3. Level 2: All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
 4. Level 3: All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Note: It is recommended that the prepared surface be coated with a drywall primer prior to the application of final finishes.
 5. Level 4: All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Note: It is recommended that the prepared surface be coated with a drywall primer prior to the application of final finishes.
 - a. Finish: Smooth.
 6. Level 5: Not Used.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Gypsum Board
1. Install and finish gypsum board to comply with ASTM C840 or GA 216.
 - a. Single Layer: Install in accordance with ASTM C840, except as amended or required by specific fire resistive or sound isolation system detailed. In that instance, application shall conform to requirements of the manufacturer's tests as reviewed and accepted in the submittal.
 - b. Double Layer: Conform to applicable portions of ASTM C840, System Classification VIII for installations applied with screws. Conform to required fire resistance standards.

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2. Apply in horizontal or vertical direction with ends and edges falling on supports. Gypsum board shall be of maximum length possible to reach full wall or ceiling lengths with minimal number of joints.
 3. Position boards so that like edges abut, tapered edges against tapered edges and field cut ends against field cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.
 4. Start installation of panels at exterior wall to position butt joints as far away from exterior wall as possible.
- B. Fire Resistant Assemblies: Wherever fire rated gypsum board construction is indicated, provide materials and installation methods, including types and spacing of fasteners, in accordance with CBC, GA Manual, or listed assembly indicated. Apply firestopping at top of wall and at penetrations through fire resistant assembly in accordance with Section 07 84 00.
- C. Sound Retardant Installations: Follow manufacturer's directions and specifications for conditions of installation. Install where indicated in conformance with acoustic requirements indicated on the Drawings. Install from floor surface to bottom side of next floor surface.
1. Wrap with insulation and Lowry Pads and seal electrical or other outlets in sound isolating partitions.
 2. Install sealant to completely fill void between gypsum board edges and adjacent surface.
- D. Wet Locations (Toilet Rooms and Utility Closets): Use Type 2 gypsum board.
1. At Walls and Ceilings: Conform to ASTM C840, System Classification X.
 2. Treat cut edges and holes in water resistant gypsum board with sealant.
- E. Fastenings: Attach gypsum board to framing with screws, lengths and sizes as recommended by manufacturer and in accordance with CBC.
- F. Accessories
1. Install corner beads at vertical and horizontal external corners.
 2. Install casing beads whenever edge of gypsum board would otherwise be exposed or semi-exposed, or where abutting dissimilar materials.
 3. After accessories are installed, correct surface damage and defects.
 4. Install trims and expansion joints where required.
- G. Allowable Tolerances
1. Offset Between Planes of Board Faces: 1/16-inch.
 2. Plane, Level, Warp and Bow: 1/8-inch in 8 feet - 0 inches.
 3. Shim panels as necessary to comply with tolerances.
- H. During inclement weather seasons or when gypsum board products will be exposed for extended periods, install Dens-Glass Gold.

3.02 FINISHING OF GYPSUM BOARD

- A. Apply joint treatment at gypsum board joints; flanges of corner bead, edge trim and penetrations, fastener heads and surface defects in accordance with ASTM C840 or GA 216. Number of coats of treatment shall be as specified above.
- B. Finish Painting: As specified in Section 09 90 00.

END OF SECTION

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SECTION 09 30 00

TILING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Porcelain tile, T-1, T-2, T-3.
 - 2. Waterproof membrane, bond coats, thin set materials and accessories.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 03 54 13 - Gypsum Cement Underlayment: Provision of gypsum cement underlayment.
 - 2. Section 05 40 00 - Cold-Formed Metal Framing: Provision of cold-formed metal framing.
 - 3. Section 05 45 00 - Metal Support Assemblies: For framing and furring.
 - 4. Section 07 92 00 - Joint Sealants: For sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 5. Section 09 29 00 - Gypsum Board: Provision of water resistant mold-proof gypsum backer board.

1.02 REFERENCES

- A. ANSI - American National Standards Institute
 - 1. A108.1 - Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar.
 - 2. A108.4 - Ceramic Tile Installed with Organic Adhesives or Water-Cleanable Tile Setting Epoxy Adhesive.
 - 3. A108.5 - Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
 - 4. A108.6 - Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy.
 - 5. A108.10 - Installation of Grout in Tilework.
 - 6. A108.11 - Interior Installation of Cementitious Backer Units.
 - 7. A118.1A - Dry-Set Portland Cement Mortar.
 - 8. A118.4 - Latex-Portland Cement Mortar.
 - 9. A118.6 - Ceramic Tile Grouts.
 - 10. A136.1 - Organic Adhesives for Installation of Ceramic Tile.
- B. TCNA - Tile Council of North America
 - 1. Handbook for Ceramic Tile Installation.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each type of product specified.
- B. Samples: Submit samples consisting of actual tiles showing full range of colors, textures, and patterns available for each type and composition of tile indicated. Include samples of grout and accessories involving color selection.

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1.04 MAINTENANCE

- A. Extra Materials: Deliver extra materials to the City. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
- B. Tile and Trim Units: Furnish quantity of full size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Daltile Corp, "Linear Color Wheel Collection Tile" or equal.
 - 1. Thin Setting and Grouting Materials: Custom Building Products; Daltile Corp.; Laticrete International, Inc., or equal.

2.02 MATERIALS

- A. Porcelain and Ceramic Tile Materials, T-1, T-2 and B-1
 - 1. Colors, Textures, and Patterns: As selected by the Architect.
 - 2. Tile Grade: Standard Grade, unless otherwise indicated.
 - 3. Porcelain Glazed Wall Tile, T-1
 - a. Size: As selected by the Architect.
 - b. Composition: Porcelain.
 - c. Face: Plain with modified square edge or cushion edge.
 - d. Product and Color: As selected by the Architect.
 - 4. Porcelain Floor Tile, T-2
 - a. Factory mounted flat tile.
 - b. Size: As selected by the Architect.
 - c. Composition: Porcelain with abrasive admixture.
 - d. Face: Plain with cushion edges.
 - e. Products and Colors: As selected by the Architect.
 - 5. Porcelain Glazed Base Tile, B-1
 - a. Size: As selected by the Architect.
 - b. Composition: Porcelain, coved.
 - c. Product and Color: As selected by the Architect.
- B. Floor Tile Waterproofing and Tile-Setting Adhesive: As manufactured by Boiard Products corporation, A QEP Company, "Estiment 324 Waterproofing, Anti-Fracture/Crack Suppressant and Tile Setting Adhesive", or equal.
- C. Wall Tile: Thin set, as manufactured by Laticrete International, Inc.; MAPEI Corporation, or equal.
- D. Grouting Materials: Commercial latex-portland cement grout; ANSI A118.6, as manufactured by Custom Building Products, "Polyblend Tile Grout", or equal.
 - 1. Colors: As scheduled on the Drawings.
- E. Sealants: As specified in Section 07 92 00.
 - 1. Interior Sealants: 70 g/l VOC maximum.
- F. Sealer: Clear, as manufactured by Bostik Findley, "CeramaSeal Grout and Tile Sealer"; Custom Building Products, "TLPSQT-3 Quart Grout/Tile Sealer", or equal.
- G. Floor to Wall Transition: As manufactured by Schluter, "Cove Transition", or equal.

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2.03 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at the Project Site before installing.

3.02 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.
- B. TCNA Installation Guidelines: TCNA "Handbook for Ceramic Tile Installation"; comply with TCNA installation methods indicated.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
- D. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.
- E. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
- F. Grout tile to comply with the requirements of the following installation standards:
 - 1. For ceramic tile grouts and latex-portland cement grouts, comply with ANSI A108.10.
 - 2. Seal grout joints at time of completion.
- G. Floor to Wall Transition: Install in accordance with manufacturer's installation instructions.

3.03 WATERPROOFING

- A. Install under tile coating waterproofing in compliance with waterproofing manufacturer's instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.

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- B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.04 WALL AND BASE TILE INSTALLATION METHODS

- A. At Wet Walls and Backsplash Conditions: Installation over Thinset Method over Water and Mold Resistant Gypsum Backer Board over Membrane over Metal Studs: Install tile to comply with TCNA installation method W244:
 - 1. Water and Mold Resistant Gypsum Backer Board: ANSI A108.11.
 - 2. Tile: ANSI A108.5.
 - 3. Grout: ANSI A108.6 or A108.10.

- B. At Dry Areas and Toilets
 - 1. Installation over Latex-Portland Cement Mortar over Cementitious Backer Units over Metal Studs: Install tile to comply with TCNA installation method W245:
 - a. Tile: ANSI A108.4 or A108.5.
 - b. Grout: ANSI A108.6 or A108.10.

3.05 APPLICATION OF SEALER

- A. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

3.06 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove latex-portland cement grout residue from tile as soon as possible.
 - 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
 - a. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
 - 3. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
 - 4. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.
 - a. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
 - 5. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

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SECTION 09 51 23

ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Provision of suspended wet-formed mineral fiber board with acoustically transparent membrane ceiling system.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
 1. A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 2. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 3. C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 4. E84 - Test Method for Surface Burning Characteristics of Building Materials.
 5. E1264 - Classification for Acoustical Ceiling Products.
- B. CBC - California Building Code, 2019 Edition
- C. UL - Underwriters Laboratories Inc.
 1. FRD - Fire Resistance Directory.

1.03 SYSTEM DESCRIPTION

- A. Design Requirements: Architectural reflected ceiling plan drawings shall govern over Mechanical and Electrical Drawings.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data completely describing products.
- B. Shop Drawings: Show complete ceiling layouts, seismic bracing methods and details of installation, and information required for related work.
- C. Samples: Provide 1 panel of each type of acoustical ceiling specified.
- D. Quality Control Submittals
 1. Manufacturer's Instructions: Submit manufacturer's installation instructions.
 2. Certification: Provide manufacturer's signed statement that gypsum board materials are asbestos free.

1.05 QUALITY ASSURANCE

- A. Qualifications: Installer shall have completed at least 3 previous projects of similar size and complexity.
- B. Regulatory Requirements: Install fire rated ceiling systems in accordance with CBC and UL FRD listing and requirements of agency having jurisdiction.

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1.06 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver and store packaged products in original containers with seals unbroken and labels intact until time of use.
- B. Storage and Protection
 - 1. Keep materials dry by storing off ground; under watertight covers.
 - 2. Immediately before installation, panels shall be stored for sufficient time to stabilize temperature and humidity conditions ambient during installation and anticipated for occupancy.

1.07 PROJECT CONDITIONS

- A. Environmental Requirements: Do not begin work until residual moisture has dissipated and comply with the following:
 - 1. Acoustical Ceilings: Maintain uniform temperature of minimum 60 degrees Fahrenheit and maximum of 90 degrees Fahrenheit and humidity of 20 to 40 percent but no more than 90 percent prior to, during and after installation.

1.08 SEQUENCING AND SCHEDULING

- A. Schedule installation of acoustic units after interior wet work is dry.
- B. Coordinate installation of ceilings with mechanical and electrical work.

1.09 MAINTENANCE

- A. Extra Materials: Provide 5 percent extra quantity of each type of acoustical surface installed. Provide in original unbroken containers plainly marked with type and quantity of contents.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Suspended Acoustical Ceiling
 - 1. Panels: Moisture resistant wet formed mineral fiber with factory applied acrylic latex paint, mildew resistant, and with the following properties:
 - . Sizes and Thickness: 24 inches by 24 inches; 3/4-inch thick.
 - a. Light Reflectance: Minimum LR 0.90 in accordance with ASTM E1264.
 - b. NRC Range: 0.70.
 - c. Edge: Vector.
 - d. Surface Burning Characteristics: Class A in accordance with ASTM E84, with flame spread 25 or under.
 - e. Color: White.
 - f. Manufacturer: Armstrong, "Ultima Vector Fine Texture, 1920", or equal.
 - 2. Mechanical Suspension System: Intermediate-duty, non-fire rated, exposed grid system for routed edge ceiling panels, double-web tees, steel body with exposed surfaces factory painted with baked polyester paint.
 - a. Provide panel centering devices built into each grid member.
 - b. Pull out tension values greater than 300 pounds.
 - c. Color: White.
 - d. Width: 15/16-inch.
 - e. Manufacturer: Armstrong, "15/16-Inch Prelude Exposed Tee System", or equal.

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- B. Fasteners and Attachments
 - 1. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, with gauge in accordance with CBC.
 - 2. Angle-Type Hangers: Angles with legs not less than 7/8-inch wide, formed from 0.0635-inch thick galvanized steel sheet complying with ASTM A653, G90 Coating Designation, with bolted connections and 5/16-inch diameter bolts.
 - 3. Ceiling Clips: Minimum 13 gauge by 3/4-inch wide, as manufactured by Hilti, "Ceiling Clips", or equal.
 - 4. Light Fixture Protection and Hold Down Clips: Provide light fixture protection panels, fasteners and hold down clips as required by UL FRD listing, manufacturer's standard types.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive acoustical treatment and verify that:
 - 1. Installation of building components located in ceiling plenum is complete.
 - 2. Spacing, direction and details of grid members and supports to accommodate installation of light fixtures, diffusers and other ceiling located items are correct.
 - 3. Areas are clean and free of materials or rubble that could damage acoustical surfaces.
- B. Do not start work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Suspended Ceiling System
 - 1. Install acoustical material and suspension system, including necessary hangers and other supporting hardware in accordance with manufacturer's instructions and ASTM C636.
 - 2. Lay work out symmetrically about centers of rooms and provide symmetrical borders not less than half size of tile specified unless noted otherwise on the Drawings.
 - 3. Make penetrations through ceiling panels in such a manner to ensure tight fit and neat appearance. Center penetrations in tile unless otherwise noted.
- B. Suspension System
 - 1. Install in accordance with CBC.
 - 2. For Hanger and Lateral Bracing Wires: Install expansion bolts or ceiling clips as required.
 - 3. Hanger Wires
 - a. Insert hanger wires around expansion bolts or through ceiling clips in accordance with Code and secure as specified for hanger wires following in this Article. Load test hanger wires as specified in Article titled "Field Quality Control" in this Section.
 - b. Plumb hanger wires. Add counterbrace wires when hanger wires are more than 1 in 6 out of plumb.
 - 4. Provide additional metal framing and hanger wires to clear furred-area interferences with suspension system. Do not penetrate ductwork with hanger wires.
 - 5. Ceiling wires and unbraced ducts, pipes and similar type items shall be separated by at least 6 inches.
 - 6. Provide hanger wires at intersection of grid members.
 - 7. Provide hanger wire supports for all recessed light fixtures and mechanical items as required for total support independent of acoustical ceiling systems.
 - 8. Use of scrap or short-cut members is not permitted.

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9. Connect grid members with positive interlocking method as standard with reviewed manufacturer.
10. Secure ends of suspension system members at 2 adjacent walls as indicated and leave floating at other 2 adjacent walls.
11. Interconnect carriers over 12 inches not interconnected to walls near free end with 16 gauge tie wire or a metal strut securely attached to prevent spreading.
12. Level grid assembly in each area after installation of mechanical and electrical equipment within 1/8inch in 12 inches or conforming to slope as appropriate to area of installation.

3.03 FIELD QUALITY CONTROL

- A. Acoustical Ceiling Connection Devices: Test devices for capability to support the following loads:
 1. Hanger Wires: 100 pounds in accordance with requirements of CBC.
 2. Lateral Force Bracing Wires: 200 pounds or actual design load whichever is greater, with safety factor of 2, in accordance with CBC.

3.04 CLEANING AND ADJUSTING

- A. Remove damaged or soiled material and replace with new prior to the Owner's acceptance of Project.

3.05 PROTECTION

- A. Protect acoustical treatment installation from damage during remainder of construction.

END OF SECTION

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SECTION 09 81 16

ACOUSTIC BLANKET INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Provision of concealed acoustic blanket insulation.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Section
 - 1. Section 06 10 00 - Rough Carpentry: Provision of wood framing.

1.02 REFERENCES

- A. ASTM - American Society for Testing and Materials
 - 1. C165 - Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
 - 2. C303 - Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
 - 3. C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 4. C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 5. C991 - Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings.
 - 6. C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
 - 7. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 8. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
 - 9. E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests.
- B. CBC - California Building Code, 2019 Edition

1.03 SYSTEM DESCRIPTION

- A. Performance Requirement: Insulation shall contain no added formaldehyde.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for insulation products specified.
- B. Certifications: Submit certification that insulation was furnished and installed in accordance with CBC requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location.

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Comply with manufacturer's recommendations for handling, storage and protection during installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Acoustic Blanket Insulation
 - 1. Unfaced, 3-1/2 inches thick, friction-fit, flexible batt or blanket of fiberglass, 15 inches width to fit stud space, and conforming to ASTM C665, Type I, non-combustible when tested in accordance with ASTM E136, and having the following fire resistive requirements when tested in accordance with ASTM E84:
 - a. Flame Spread: 10 or less.
 - b. Smoke Developed: 10 or less.
 - 2. Product: As manufactured by Owens-Corning Fiberglas Corp., "Thermal Batts Insulation"; Johns Manville Corp., or equal.
- B. Insulation Support: Galvanized springwire and staples as required.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions with installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's instructions applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.
- B. Extend insulation full thickness as indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.
- C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness of the cavity being filled.

3.03 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, use mechanical anchorage to provide permanent placement and support of units.
- B. Maintain required separations from electric fixtures and appliances.

3.04 PROTECTION

- A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where

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insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

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SECTION 09 90 00

PAINTING AND COATING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Surface preparation, painting and finishing of exposed interior and exterior items and surfaces for opaque and transparent painting, P-1, P-2, P-3 and P-4.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 05 50 00 - Metal Fabrications: For shop priming ferrous metal.
 - 2. Section 06 20 00 - Finish Carpentry: For interior wood trim and wood doors.
 - 3. Section 08 14 16 - Flush Wood Doors: For finish painting of wood doors.
 - 4. Section 08 31 13 - Access Doors and Frames: For finish painting of access doors and frames.
 - 5. Section 08 71 00 - Door Hardware: For protection of door hardware.
 - 6. Section 08 91 00 - Fixed Louvers: For finish painting of louvers.
 - 7. Section 09 29 00 - Gypsum Board: For finish painting of gypsum board.

1.02 REFERENCES

- A. CFR - Code of Federal Regulations
 - 1. 40 CFR 59 - National VOC Emission Standards for Consumer and Commercial Products - Standardized Conditions.
- B. EPA - Environmental Protection Agency
 - 1. Method 24 - Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings.
- C. FM - Factory Mutual
- D. SSPC - The Society for Protective Coatings
 - 1. SP-10 - Surface Preparation Specification No. 10: Near-White Blast Cleaning.
- E. UL - Underwriters Laboratories Inc.

1.03 DEFINITIONS

- A. "Paint": As used herein, means coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers, and other applied materials whether used as prime, intermediate or finish coats.

1.04 SYSTEM DESCRIPTION

- A. Performance Requirements
 - 1. Paint exposed surfaces whether or not colors are designated in the schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Engineer will select from standard colors or finishes available.

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2. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts and labels.
3. Do not paint over UL, FM or other code required labels or equipment name, identification, performance rating or nomenclature plates.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each paint system specified, including block fillers and primers.
 1. Provide manufacturer's technical information including label analysis and instructions for handling, storage and application of each material proposed for use.
 2. List each material and cross reference the specific coating, finish system and application. Identify each material by the manufacturer's catalog number and general classification.
- B. Samples: Following the selection of colors and glosses by the Architect, submit samples for the Architect's review.
 1. Provide 3 samples of each color and each gloss for each material on which the finish is specified to be applied.
 2. Except as otherwise directed by the Architect, make samples approximately 8 inches by 10 inches in size.
 3. Do not commence finish painting until approved samples are on file at the job site.
- C. Quality Control Submittals: Provide certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

1.06 QUALITY ASSURANCE

- A. Provide primers and undercoat paint produced by the same manufacturer as finish coats.
 1. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrates.
 2. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
 3. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as required.
 4. Notify the Engineer in writing of anticipated problems in using the specified coating systems over prime coatings supplied under other Sections.
- B. Qualifications
 1. Applicator: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Provide field mockups for final paint color and texture approval in the form of actual application of the materials on actual surfaces to be painted for approval by the Architect. Areas shall be 10 feet by 10 feet.
 1. Field mockups, when approved, will become standards of color and finish for accepting or rejecting the work of this Section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Acceptance at Site: Deliver materials to the job site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

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1. Product name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
- B. Storage and Protection
1. Store materials not in use in tightly covered containers in well ventilated area at minimum ambient temperature of 45 degrees Fahrenheit. Maintain containers used in storage in clean condition, free of foreign materials and residue.
 2. Protect from freezing. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.08 PROJECT CONDITIONS

- A. Environmental Requirements
1. Apply water based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 degrees Fahrenheit, unless otherwise permitted by the manufacturers' printed instructions as approved by the Architect.
 2. Do not apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 45 degrees Fahrenheit, unless otherwise permitted by the manufacturers' printed instructions as approved by the Architect.
 3. Do not apply paint in rain, fog or mist; or when the relative humidity exceeds 85 percent. Do not apply paint to damp or wet surfaces, unless otherwise permitted by the manufacturers' printed instructions as approved by the Architect.
 4. Applications may be continued during inclement weather only within the temperature limits specified by the paint manufacturer as being suitable for use during application and drying periods.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Sherwin Williams; Benjamin Moore; PPG; Pratt & Lambert; Frazee; Tnemec; Rustoleum; Olympic, or equal.

2.02 PAINT MATERIALS

- A. Paint Materials, General: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer, based on testing and field experience.
- B. Material Quality: Provide manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
- C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the

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following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:

1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
 2. Nonflat Paints and Coatings: VOC content of not more than 50 g/L mat, regardless of sheen.
 3. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 4. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.
 - u. Methylene chloride.
 - v. Naphthalene.
 - w. Toluene (methylbenzene).
 - x. 1,1,1-trichloroethane.
 - y. Vinyl chloride.
- D. Colors: As scheduled on the Drawings.

2.03 APPLICATION EQUIPMENT

- A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint, and as approved by the Architect.
- B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied, and that integrity of the finish will not be jeopardized by use of the proposed equipment.

2.04 OTHER MATERIALS

- A. Provide other materials not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

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PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the areas and surface conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work.
- B. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. General
 - 1. Mix and prepare paint materials in strict accordance with the manufacturers' recommendations as approved by the Architect.
 - 2. When materials are not in use, store in tightly covered containers.
 - 3. Maintain containers used in storage, mixing and application of paint in a clean condition, free from foreign materials and residue.
- B. Stirring
 - 1. Stir materials before application, producing a mixture of uniform density.
 - 2. Do not stir into the material any film which may form on the surface, but remove the film and, if necessary, strain the material before using.
- C. Surface Preparation
 - 1. Perform preparation and cleaning procedures in strict accordance with the paint manufacturers' recommendations as approved by the Architect.
 - 2. Remove removable items which are in place and are not scheduled to receive paint finish; or provide surface applied protection prior to surface preparation and painting operations.
 - 3. Following completion of painting in each space or area, reinstall the removed items by using workmen who are skilled in the necessary trades.
 - 4. Clean each surface to be painted prior to applying paint or surface treatment.
 - 5. Remove oil and grease with clean cloths and cleaning solvent of low toxicity and flash point in excess of 200 degrees Fahrenheit prior to start of mechanical cleaning.
 - 6. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.
 - 7. Provide barrier coats over incompatible primers or remove and reprime.
- D. Preparation of Wood Surfaces
 - 1. Clean wood surfaces until free from dirt, oil, and other foreign substance.
 - 2. Smooth finished wood surfaces exposed to view, using the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniformly smooth and unmarred wood surface.
 - 3. Unless specifically approved by the Architect, do not proceed with painting of wood surfaces until the moisture content of the wood is 12 percent or less as measured by a moisture meter approved by the Architect.
 - 4. Back prime concealed exterior wood surfaces.
- E. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.
 - 1. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC SP 10.
 - 2. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.

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3. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
- F. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

3.03 PAINT APPLICATION

- A. General:
1. Touch-up shop-applied prime coats which have been damaged, and touch-up bare areas prior to start of finish coats application.
 2. Slightly vary the color of succeeding coats.
 - a. Do not apply additional coats until the completed coat has been inspected and approved.
 - b. Only the inspected and approved coats of paint will be considered in determining the number of coats applied.
 3. Sand and dust between coats to remove defects visible to the unaided eye from a distance of 5 feet.
 4. On removable panels and hinged panels, paint the back sides to match the exposed sides.
- B. Drying
1. Allow sufficient drying time between coats, modifying the period as recommended by the material manufacturer to suite adverse weather conditions.
 2. Consider oil base and oleo-resinous solvent-type paint as dry for re-coating when the paint feels firm; does not deform or feel sticky under moderate pressure of the thumb, and when the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- C. Brush Applications
1. Brush out and work the brush coats onto the surface in an even film.
 2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness and other surface imperfections will not be acceptable.
- D. Spray Application
1. Where spray application is used, apply each coat to provide the hiding equivalent of brush coats.
 2. Do not double back with spray equipment to build up film thickness of 2 coats in 1 pass.
 3. Protect all adjacent buildings, cars, plants, floors, etc., from over spray.
- E. For completed work, match the approved samples as to texture, color and coverage. Remove, refinish or repaint work not in compliance with the specified requirements.
- F. Miscellaneous Surfaces and Procedures
1. Exposed Mechanical Items
 - a. Finish electric panels, access doors, conduits, pipes, ducts, grilles, registers, vents and items of similar nature to match the adjacent wall and ceiling surfaces, or as directed.
 - b. Paint visible duct surfaces behind vents, registers, and grilles flat black.
 - c. Wash metal with solvent, prime and apply 2 coats of alkyd enamel.
 2. Exposed Pipe and Duct Insulation
 - a. Apply 1 coat of latex paint on insulation which has been sized or primed under other Sections; apply 2 coats on such surfaces when unprepared.
 - b. Match color of adjacent surfaces.

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- c. Remove band before painting, and replace after painting.
3. Hardware
 - a. Paint prime coated hardware to match adjacent surfaces.
 - b. Paint metal portions of head seals, jamb seals, and astragal seals to match the color of the door frame unless otherwise directed by the Architect.
4. Wet Areas
 - a. For oil base paints, use 1 percent phencimercuric or 4 percent tetrachlorophenol.
 - b. For water emulsion and glue size surfaces, use 4 percent sodium tetrachlorophenate.
5. Exposed Vents: Apply 2 coats of heat resistant paint approved by the Architect.

3.04 EXTERIOR PAINT SCHEDULE

- A. Ferrous Metal
 1. Primer is not required on shop-primed items.
 2. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a rust-inhibitive primer.
 - a. Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.
 - 1) Product: Sherwin Williams, or equal.
 - b. First and Second Coats: Semigloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils.
 - 1) Product: Sherwin Williams, or equal.
- B. Zinc-Coated Metal
 1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a galvanized metal primer as necessary if not pre-primed.
 - a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) Product: Sherwin Williams, or equal.
 - b. First and Second Coats: Semigloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils.
 - 1) Product: Sherwin Williams, or equal.
- C. Cast-In-Place Concrete
 1. Primer for Elastomeric Coating: Apply 1 coat of chalk binding primer by brush, roller or spray to all surfaces to be coated with elastomeric coating, at the approximate rate of 1 gallon per 250 square feet. Do not apply more primer than can be coated over within 4 hours.
 2. Patching and finish coating must be applied while the primer is still slightly tacky. If the primer is allowed to dry hard before coating, an additional coat of primer must be applied.
 3. Finish Coat Waterproof Coating
 - a. Apply the finish coating in 2 coats by roller or with appropriate spray equipment, with adequate drying time in between.
 - b. Completed coverage shall be minimum 1.5 gallons per 100 square feet on vertical surfaces; minimum 2 gallons per 100 square feet on horizontal surfaces. The finished wet film thickness shall be at least 20 mils. Minimum dry mil thickness shall be 16 to 20 mils, total. Porous surfaces may require additional material to attain the intended coverage.
 - c. Provide a finish coating which is uniform in appearance and texture.
 4. Product: Sherwin Williams, or equal.

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3.05 INTERIOR PAINT SCHEDULE

- A. Gypsum Board Walls and Ceilings - Where Indicated
 - 1. Flat Acrylic Finish: Finish coat to cover over a primer.
 - a. Primer: Latex based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) Product: Sherwin Williams, or equal.
 - b. Finish Coat: Flat, acrylic latex based, interior paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.5 mils.
 - 1) Product: Sherwin Williams, or equal.

- B. Gypsum Board Walls and Ceilings at "Wet Areas" and Where Indicated
 - 1. Semigloss Acrylic Enamel Finish: 2 finish coats over a primer at toilet room walls and ceilings and at other "wet areas".
 - a. Primer: Latex based, interior primer applied at spreading rate recommended by the manufacturer.
 - 1) Product: Sherwin Williams, or equal.
 - b. Finish Coats: Factory formulated full gloss acrylic-latex interior enamel applied at a spreading rate recommended by the manufacturer.
 - 1) Product: Sherwin Williams, or equal.

- D. Ferrous Metal
 - 1. Semigloss, Acrylic Enamel Finish: 1 finish coat over an enamel undercoat and a primer. Primer is not required on shop-primed items.
 - a. Primer: Quick drying, rust-inhibitive alkyd based or epoxy metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.
 - 1) Product: Sherwin Williams, or equal.
 - b. Undercoat: Alkyd, interior enamel undercoat or semigloss, acrylic latex, interior enamel, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.
 - 1) Product: Sherwin Williams, or equal.
 - c. Finish Coat: Semigloss, acrylic latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.
 - 1) Product: Sherwin Williams, or equal.

- E. Galvanized Metal
 - 1. Semigloss, Acrylic Enamel Finish: 2 finish coats over a primer.
 - a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) Product: Sherwin Williams, or equal.
 - b. First and Second Coats: Semigloss, acrylic latex interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils.
 - 1) Product: Kelly Moore, or equal.

END OF SECTION

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SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Code required signs as indicated.
 - 1. Coordinate with the City's signage program.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 REFERENCES

- A. ADA - Americans with Disabilities Act
 - 1. March 15, 2012 ADA Standards for Accessible Design
- B. CBC - California Building Code, 2019 Edition

1.03 SYSTEM DESCRIPTION

- A. Design Requirements: Design toilet room signs as required by ADA and CBC and in compliance with the City's standards.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with jurisdiction, ADA and CBC requirements for signage to include Braille.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's product data describing materials and signs.
- B. Shop Drawings
 - 1. Provide shop drawings showing construction details for approval before proceeding with fabrication. Include full size details of exposed edges, joints between materials, hanging, hinging and locking systems and any other details which would affect sign appearance.
 - 2. Fasteners: Detail methods of fastenings and provide exact specifications for all fasteners noted on shop drawings.
 - 3. Artwork
 - a. Submit full size patterns or prints of typical copy layouts and/or graphic elements to be applied on signs. Using layouts on the Drawings as a guide, optically enlarge and hand correct images before submitting to the Architect for approval before fabrication.
 - 4. Sign Location: Provide Graphic Schedule and location plans to identify and locate all signs. Item numbers listed in the Graphic Schedule shall be found on location plans and shall identify locations of specific sign items.
- C. Samples
 - 1. On 6 inches by 6 inches pieces of actual sign materials, submit to the Architect for review and approval, 5 samples of painted and graphic finishes, in each material, color and finish, with texture to simulate actual conditions.
 - 2. Provide listing of the material and application for each finish sample.

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3. Be prepared to resubmit each sample as requested until required sheen, color and texture are approved.
 4. Acrylic: Submit color and finish samples of plastics for approval before proceeding with fabrication. No substitution in color, thickness, finish or plastics will be accepted without written approval of the Architect.
 5. Fasteners: Submit 1 sample of all fasteners and hardware for approval.
 6. Paint: Submit 5 color and finish samples of all paints and finishes for approval prior to fabrication.
- D. Operation and Maintenance: Provide the City with proper cleaning instructions required for continued maintenance of signs.

1.06 QUALITY ASSURANCE

- A. Pre-Installation Conferences: Sign locations shown on the location plans are for general information only. Prior to installation and as required, arrange meetings with the Architect at the site for final location for all sign items.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: As selected by the Architect.

2.02 MATERIALS

- A. Interior Signs: Provide wall mounted signs as indicated.
- B. Exterior Signs: Provide signs as indicated in accordance with ADA.
- C. Accessibility Symbol: Provide 0.125-inch thick clear plexiglass, back painted contrasting color as required by Building Department and Title 24.
- D. Engraved Process: As indicated.
- E. Dimensional Letters: As indicated.
- F. Mounting: On doors and walls in accordance with manufacturer's recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General
1. Install signage in neat and proper manner.
 2. Install sign items, including all components, in accordance with reviewed Graphic Schedule at locations shown.
 3. Install signs properly aligned, level and true to line and dimension.
- B. Install with reviewed manufacturer's adhesive or mechanical fasteners after application of finish painting at heights noted.

3.02 SCHEDULE

- A. Provide signs at the locations and messages scheduled below and as otherwise indicated in contrasting colors and with Braille messages in accordance with ADA requirements:

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1. At Men's Toilet:
 - a. Men's Restroom.
 2. At Women's Toilet:
 - a. Women's Restroom.
- B. Miscellaneous Building Signage
1. Wayfinding signage.
 2. Room signs.
 3. ADA entrance signs.
 4. ADA signage.
 5. Drinking fountain signage.
- C. Miscellaneous Building Signage
1. Street Address: As selected by the Architect.

END OF SECTION

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SECTION 10 21 13.20

SOLID PHENOLIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Floor mounted, overhead braced solid phenolic toilet partitions and urinal screens.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Sections
 - 1. Section 09 30 00 - Tiling: Provision of ceramic tile.
 - 2. Section 10 28 13 - Toilet Accessories: Provision of toilet accessories.

1.02 REFERENCES

- A. ADA - Americans with Disabilities Act
 - 1. March 15, 2012 ADA Standards for Accessible Design
- B. ASTM - American Society for Testing and Materials
 - 1. E84 - Test Method for Surface Burning Characteristics of Building Materials.
- C. CBC - California Building Code, 2019 Edition
- D. UL - Underwriters Laboratories Inc.
 - 1. FRD - Fire Resistance Directory.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for materials, fabrication, and installation including catalog cuts of anchors, hardware, fastenings, and accessories.
- B. Shop Drawings: Submit shop drawings for fabrication and erection of toilet compartment assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.
- C. Samples
 - 1. Submit 2 samples of partition panels, approximately 3 inches by 5 inches in size, and two 12 inches long headsail brace samples illustrating material and finish.
 - 2. Submit 2 samples of door hardware illustrating material and finish.
 - 3. Submit 2 samples of plastic surface materials for finish and color selection.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Install fire rated ceiling systems in accordance with CBC and UL FRD listing and requirements of agency having jurisdiction.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on shop drawings.

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- B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating toilet compartments without field measurements. Coordinate wall, floor, ceilings, and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Bobrick Washroom Equipment, Inc., or equal.

2.02 MATERIALS

- A. General: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable.
- B. Solid Plastic: Solid phenolic material, meeting ASTM E84, with high pressure matte finish melamine surfaces fused to core with adhesives containing no urea formaldehyde. Edges shall be black.
1. Flame Spread: 69.
 2. Smoke Density: 93.
- C. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
- D. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard stainless steel, Type 304.
- E. Full Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters with stainless steel, Type 304, brackets.
- F. Hardware and Accessories: Manufacturer's standard design, heavy duty operating hardware and accessories of stainless steel, Type 304.
1. Provide continuous steel hinge; provide self-closing hinge at accessible compartments.
 2. Door hardware shall include stop, keeper, concealed latch with emergency access, coat hook/bumper, and stainless steel vandal-resistant fasteners.
 - a. Mount coat hook/bumper to panel with through bolts; do not mount to door.
 - b. Mount coat hook/bumper 48 inches above finished floor at accessible compartments.
 - c. Provide U-shaped pulls at both sides of accessible compartment doors.
- G. Overhead Bracing: Manufacturer's standard continuous, extruded aluminum head rail with antigrip profile in manufacturer's standard finish.
- H. Anchorages and Fasteners: Manufacturer's standard theft-proof exposed fasteners finished to match hardware.

2.03 FABRICATION

- A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.
- B. Provide manufacturer's standard corrosion resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing

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continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

- C. Door Dimensions: Unless otherwise indicated, furnish 24 inches wide in-swinging doors for ordinary toilet stalls and 32 inches wide (clear opening) out-swinging doors for stalls equipped for use by handicapped in accordance with ADA requirements.
- D. Floor Mounted Screens: Provide panel units in sizes indicated, of same construction and finish as compartment system panels.
- E. Hardware: Furnish hardware for each compartment to comply with ADA for handicapped accessibility and as follows:
 - 1. Hinges: Cutout inset type, adjustable to hold door open at any angle up to 90 degrees. Provide gravity type, spring-action cam type, or concealed torsion rod type to suit manufacturer's standards.
 - 2. Latch and Keeper: Manufacturer's standard surface mounted latch unit, designed for handicapped accessibility, with combination rubber-faced door strike and keeper.
 - 3. Coat Hook: Manufacturer's standard unit, combination hook and rubber-tipped bumper, sized to prevent door hitting mounted accessories.
 - 4. Door Pull: Manufacturer's standard unit for out-swinging doors. Provide pulls on both faces of handicapped compartment doors.

2.04 FINISH

- A. Color: As selected by the Architect from manufacturer's standard range.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Comply with manufacturer's recommended procedures and written installation instructions and sequence. Install compartment units rigid, straight, plumb, and level. Provide clearances of not more than 1/2-inch between pilasters and panels, and not more than 1 inch between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.
- B. Secure pilasters to floor and level, plumb and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor Mounted Urinal Screens: Attach with anchoring devices as recommended by manufacturer to suit supporting structure. Set units to provide support and to resist lateral impact.

3.02 ADJUST AND CLEAN

- A. Hardware Adjustment: Adjust and lubricate hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors (and entrance swing doors) to return to fully closed position.
- B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION

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SECTION 10 28 13

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Toilet accessories, including backing plates for grab bars.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 REFERENCES

- A. ADA - Americans with Disabilities Act
- B. AISI - American Iron and Steel Institute
- C. ASTM - American Society for Testing and Materials
 1. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 2. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 3. B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 4. F446 - Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.
- D. CBC - California Building Code, 2019 Edition

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each toilet accessory item specified, including construction details relative to materials, dimensions, gauges, profiles, mounting method, specified options, and finishes.
- B. Shop Drawings: Submit setting drawings where cutouts are required in other work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.
- C. Contract Closeout Submittals: Submit maintenance instructions including replaceable parts and service recommendations.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements
 1. Grab Bars and Fasteners: Strength of grab bars, fasteners and mounting devices shall comply with CBC Section 1106.6.3 and ADA requirements.
 2. Grab Bar Surfaces: Conform to CBC Section 1115B.8.4.
 3. Mounting Heights of Accessories: Comply with requirements of CBC Sections 1115B.3 and 1115B.9.
 4. Operating Pressure for Soap Dispensers: Comply with ADA.
- B. Inserts and Anchorages: Furnish accessory manufacturers' standard concealed inserts and anchoring devices. Coordinate delivery with other work to avoid delay.

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1.05 PROJECT CONDITIONS

- A. Coordination: Coordinate accessory locations, installation, and sequencing with other work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

1.06 WARRANTY

- A. Warranty: Submit a written warranty executed by mirror manufacturer, agreeing to replace any mirrors that develop visible silver spoilage defects within warranty period.
- B. Warranty Period: 10 years from date of Substantial Completion.
- C. Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Bobrick Washroom Equipment, Inc.; Bradley Corporation, or equal.

2.02 MATERIALS

- A. General: Fabricate toilet accessory items from the following materials and according to requirements specified for individual accessory items:
 - 1. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gauge minimum thickness, unless otherwise indicated.
 - 2. Galvanized Steel Sheet: ASTM A653, G60.
 - 3. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B456, Type SC 2.
 - 4. Galvanized Steel Mounting Devices: ASTM A153, hot-dip galvanized after fabrication.
 - 5. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.
 - 6. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply. Provide a minimum of 6 keys to the Owner.

2.03 ACCESSORIES

- A. Toilet Accessories
 - 1. Typical: As scheduled on the Drawings.
 - 2. Foldable Step Stools Attached To The Floor: As manufactured by EZ Fold, Folding Step Stool.
 - a. Capacity: 300 pounds
 - b. Dimensions
 - 1) Open: 16.27 inches long by 12.5 inches wide by 12 inches high.
 - 2) Closed: 16.75 inches long by 2 inches wide by 16.625 inches high.
- B. Mounting Plates: Non-corrosive material. Provide as required.

2.04 FABRICATION

- A. General: Only a maximum 1-1/2 inches diameter, unobtrusive stamped manufacturer logo, as approved by the Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by

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either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.

- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install toilet accessory units according to manufacturer's instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.
- B. Install grab bars to withstand a downward load of at least 250 lbf, complying with ASTM F446.

3.02 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION

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SECTION 221140 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.
- B. Related Sections include the following:
 - 1. Division 22 Section "Plumbing Specialties" for water distribution piping specialties.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing domestic water piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Domestic Water Service Piping: 125 psig.
 - 2. Domestic Water Distribution Piping: 125 psig.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.
- B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- C. Transition Couplings for Underground Pressure Piping: AWWA C219, metal, sleeve-type coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

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2.2 COPPER TUBING

- A. Soft Copper Tube: ASTM B 88, Types K and L, water tube, annealed temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

- B. Hard Copper Tube: ASTM B 88, Types K and L, water tube, drawn temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
 - 4. Copper, Grooved-End Fittings: ASTM B 75 copper tube or ASTM B 584 bronze castings.
 - a. Copper-Tubing, Keyed Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

2.3 VALVES

- A. Refer to Section 231110 "Valves" for bronze and cast-iron, general-duty valves.
- B. Refer to Section 221430 "Plumbing Specialties" for balancing and drain valves.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Refer to Section 231050 "Basic Mechanical Materials and Methods" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- B. Flanges may be used on above ground piping, unless otherwise indicated.
- C. Grooved joints may be used on above ground grooved-end piping.
- D. Fitting Option: Mechanically formed tee-branch outlets and brazed joints may be used on above ground copper tubing.
- E. Underground Domestic Water Service Piping: Use any of the following piping materials for each size range:

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1. NPS 2 and Smaller: Soft copper tube, Type K, copper pressure fittings; and soldered joints.
2. NPS 2-1/2 to NPS 3-1/2: Use NPS 3 or NPS 4 ductile-iron pipe; mechanical push-on - joint, ductile-iron fittings; and restrained, gasketed joints.
3. NPS 2-1/2 to NPS 3-1/2: Soft copper tube, Type K, copper pressure fittings; and soldered joints.
4. NPS 4 to NPS 8: Mechanical Push-on-joint, ductile-iron pipe; mechanical push-on -joint, ductile-iron fittings; and restrained, gasketed joints.

F. Aboveground & Underground Domestic Water Piping

1. NPS 2 and Smaller: Soft copper tube, Type K; No joints below floor.
2. NPS 2 1/2 “ and larger: Hard copper tube, Type K copper pressure fittings; and soldered joints.

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
3. Drain Duty: Hose-end drain valves.

3.4 PIPING INSTALLATION

- A. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated.
- C. Install underground ductile-iron piping according to AWWA C600 and AWWA M41. Install buried piping inside building between wall and floor penetrations and connection to water service piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.
 1. Encase piping with polyethylene film according to ASTM A 674 or AWWA C105.
- D. Install underground copper tubing according to CDA's "Copper Tube Handbook."
- E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.
- F. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for wall penetration systems.
- G. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each domestic water service. Refer to Division 22 Section "Plumbing Specialties" for drain valves and strainers.

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- H. Install water-pressure regulator downstream from main shutoff valve. Refer to Division 22 Section "Plumbing Specialties" for water-pressure regulators.
- I. Install aboveground domestic water piping level and plumb.
- J. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.
- K. Perform the following steps before operation:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
- L. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.
- M. Check plumbing specialties and verify proper settings, adjustments, and operation.
 - 1. Water-Pressure Regulator: Set outlet pressure at 80 psig maximum, unless otherwise indicated.

3.5 JOINT CONSTRUCTION

- A. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- C. Grooved Joints: Assemble joints with keyed-coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- D. Mechanically Formed Outlets: Form tee in copper tube according to equipment manufacturer's written instructions. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

3.6 ROUGHING-IN FOR WATER METERS

- A. Rough-in domestic water piping and install water meters according to City of Mountain View's requirements. Refer to Division 22 Section "Meters and Gages" for water meters.

3.7 VALVE INSTALLATION

- A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.
- B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

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- C. Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 - 1. Install hose-end drain valves at low points in water mains, risers, and branches.
 - 2. Install stop-and-waste drain valves where indicated.

3.8 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 22 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 22 Section "Hangers and Supports."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - 3. NPS 2: 10 feet with 3/8-inch rod.
 - 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 - 5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
- F. Install supports for vertical steel piping every 15 feet.
- G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
- H. Install supports for vertical copper tubing every 10 feet.
- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.9 CONNECTIONS

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- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to service piping with shutoff valve, and extend and connect to the following:

3.10 FIELD QUALITY CONTROL

- A. Inspect domestic water piping as follows:
 - 1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - 3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- B. Test domestic water piping as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - 4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 - 5. Prepare reports for tests and required corrective action.

3.11 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

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- c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 221140

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SECTION 221150 - SANITARY WASTE, VENT, AND STORM DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes soil and waste, sanitary drainage, vent, and storm drain piping inside the building and to locations indicated.

1.3 DEFINITIONS

- A. The following are industry abbreviations for plastic piping materials:
 - 1. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Soil, Waste, Vent, and Storm Drain Piping: 10-foot head of water.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

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- B. Flexible Transition Couplings for Underground Nonpressure Piping: ASTM C 1173 with elastomeric sleeve. Include ends of same sizes as piping to be joined and include corrosion-resistant metal band on each end.
- C. Transition Couplings for Underground Pressure Piping: AWWA C219 metal, sleeve-type coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.2 CAST-IRON SOIL PIPING

- A. Hubless Pipe and Fittings: ASTM A 888 or CISPI 301.
 - 1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral, center pipe stop.

2.3 COPPER TUBING

- A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
 - 1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

2.4 CONDENSATE DRAINAGE PIPING

- A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
 - 1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Refer to Division 2 Section for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
- B. Flanges may be used on aboveground pressure piping, unless otherwise indicated.

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- C. Aboveground & underground, Soil, Waste, Vent, and Storm Drain Piping: Use the following piping materials for each size range:
1. NPS 1-1/4 and NPS 1-1/2: Copper DWV tube, copper drainage fittings, and soldered joints.
 2. NPS 2 to NPS 4: Service class, cast-iron soil piping; gaskets; and gasketed joints.
 3. NPS 2 to NPS 4: Hubless, cast-iron soil piping and one of the following:
 4. NPS 2 to NPS 4: cast-iron, threaded drainage fittings; and threaded joints.

3.3 PIPING INSTALLATION

- A. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- C. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.
- D. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- E. Make changes in direction for soil and waste drainage, vent, and storm drain piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- F. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- G. Install soil and waste drainage, vent, and storm drain piping at the following minimum slopes, unless otherwise indicated:
1. Building Sanitary and Storm Drain: 2 percent downward in direction of flow for piping of all sizes.

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2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- H. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

- A. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
 2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
- C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- D. Grooved Joints: Assemble joint with keyed coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 22 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 22 Section "Hangers and Supports."
- C. Support vertical piping and tubing at base and at each floor.

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- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
- F. Install supports for vertical cast-iron soil piping every 15 feet.
- G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - 3. NPS 2: 10 feet with 3/8-inch rod.
 - 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 - 5. NPS 3: 12 feet with 1/2-inch rod.
 - 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
- H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 3. NPS 2-1/2: 108 inches with 1/2-inch rod.
- I. Install supports for vertical copper tubing every 10 feet.
- J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste and storm drain piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

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2. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Specialties."

3.7 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage, vent and storm drain piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 6. Prepare reports for tests and required corrective action.

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3.8 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 221150

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SECTION 221194 - FUEL GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes fuel gas piping, specialties, and accessories within the building.

1.3 PROJECT CONDITIONS

- A. Design values of fuel gas supplied for these systems are as follows:
 - 1. Nominal Heating Value: 1000 Btu/cu. ft..
 - 2. Nominal Specific Gravity: 0.6.

1.4 QUALITY ASSURANCE

- A. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ANSI Standard: Comply with ANSI Z223.1, "National Fuel Gas Code."
- C. UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Gas Valves, NPS 2 and Smaller:

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- a. BMI Canada, Inc.
 - b. Crane Valves.
 - c. Dungs: Karl Dungs, Inc.
 - d. Flow Control Equipment, Inc.
 - e. Grinnell Corp.
 - f. Honeywell, Inc.
 - g. Jomar International, Ltd.
 - h. Lyall: R. W. Lyall & Co., Inc.
 - i. McDonald: A. Y. McDonald Mfg. Co.
 - j. Milwaukee Valve Co., Inc.
 - k. Mueller Co.; Mueller Gas Products Div.
 - l. Nibco, Inc.
 - m. Red-White Valve Corp.
 - n. Watts Industries, Inc.; Water Products Div.
2. Plug Valves, NPS 2-1/2 and Larger:
- a. Flow Control Equipment, Inc.
 - b. Milliken Valve Co., Inc.
 - c. Nordstrom Valves, Inc.
 - d. Olson Technologies, Inc.; Homestead Valve Div.
 - e. Walworth Co.
3. UL-Listed Earthquake Valves:
- a. Energy Pacific.
 - b. Safe T Quake Corp.
 - c. Seismic Safety Products, Inc.
 - d. Seismic Valve Co., Inc.
 - e. Trembler-Tech, Inc.
 - f. Westcoast Seismic Protection Co., Ltd.
4. Service Pressure Regulators:
- a. American Meter Co.
 - b. Equimeter, Inc.
 - c. Fisher Controls International, Inc.
 - d. National Meter.
 - e. Richards Industries, Inc.; Jordan Valve Div.
 - f. Schlumberger Industries; Gas Div.
5. Line Pressure Regulators:
- a. American Meter Co.
 - b. Donkin: Bryan Donkin RMG Canada, Ltd.
 - c. Eclipse Combustion, Inc.
 - d. Equimeter, Inc.

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- e. Fisher Controls International, Inc.
- f. Maxitrol Co.
- g. National Meter.
- h. Richards Industries, Inc.; Jordan Valve Div.
- i. Schlumberger Industries; Gas Div.

2.2 PIPING MATERIALS

- A. Refer to Part 03 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

- A. Steel Pipe: ASTM A 53; Type E or S; Grade B; Schedule 40; black.
 - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.
 - 2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
 - 3. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
 - 4. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.
 - 5. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
 - 6. Joint Compound and Tape: Suitable for natural gas.
 - 7. Steel Flanges and Flanged Fittings: ASME B16.5.
 - 8. Gasket Material: Thickness, material, and type suitable for natural gas.

2.4 PIPING SPECIALTIES

- A. Flexible Connectors: ANSI Z21.24, copper alloy.
- B. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

2.5 SPECIALTY VALVES

- A. Valves, NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
- B. Valves, NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

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- C. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.
- D. Gas Valves, NPS 2 and Smaller: ASME B16.33 and IAS-listed bronze body and 125-psig pressure rating.
 - 1. Tamperproof Feature: Include design for locking.
- E. Plug Valves, NPS 2-1/2 and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.
 - 1. Tamperproof Feature: Include design for locking.
- F. Earthquake Valves: FM approved or listed in IAS Directory as complying with ASCE/HQ and UL listed. Include mechanical operator.

2.6 SERVICE METERS

- A. Service Meters: Positive-displacement type suitable for fuel gas service. Include metal case, temperature compensation, corrosion-resistant internal components, and flow registered in cubic feet per hour.
 - 1. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - 2. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
 - 3. Type: ANSI B109.3, rotary.

2.7 PRESSURE REGULATORS

- A. Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.
 - 1. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - 2. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
- B. Pressure Regulator Vents: Factory- or field-installed, corrosion-resistant screen in opening if not connected to vent piping.

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PART 3 - EXECUTION

3.1 SERVICE ENTRANCE PIPING

- A. Extend fuel gas piping and connect to fuel gas distribution for service entrance to building.
 - 1. Exterior fuel gas distribution system piping, service pressure regulator, and service meter will be provided by gas utility.
- B. Install dielectric fitting downstream from and adjacent to each service meter unless meter is supported from service-meter bar with integral dielectric fitting. Install shutoff valve downstream from and adjacent to dielectric fitting.

3.2 PIPING APPLICATIONS

- A. Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.
- B. Fuel Gas Piping, 0.5 psig or Less: Use the following:
 - 1. NPS 1/2 and Smaller: NPS 3/4 steel pipe, malleable-iron threaded fittings, and threaded joints.
 - 2. NPS 3/4 and NPS 1: Steel pipe, malleable-iron threaded fittings, and threaded joints.
 - 3. NPS 1-1/4 to NPS 2: Steel pipe, malleable-iron threaded fittings, and threaded joints.
 - 4. NPS 2-1/2 to NPS 4: Steel pipe, steel welding fittings, and welded joints.
 - 5. Larger Than NPS 4: Steel pipe, steel welding fittings, and welded joints.
- C. Fuel Gas Piping 2 to 5 psig: Use the following:
 - 1. NPS 2 and Smaller: Steel pipe, steel welding fittings, and welded joints.
 - 2. NPS 2-1/2 to NPS 4: Steel pipe, steel welding fittings, and welded joints.
 - 3. Larger Than NPS 4: Steel pipe, steel welding fittings, and welded joints.
- D. Underground Fuel Gas Piping: Steel pipe, steel welding fittings, and welded joints. Encase in containment conduit.
- E. Gas Service Piping at Meters and Regulators, Above 5 psig: Steel pipe, steel welding fittings, and welded joints.

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3.3 VALVE APPLICATIONS

- A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.
- B. Appliance Shutoff Valves for Pressure 0.5 to 2 psig: Gas stop or gas valve.
- C. Appliance Shutoff Valves for Pressure 2 to 5 psig: Gas valve.
- D. Piping Line Valves, NPS 2 and Smaller: Gas valve.
- E. Piping Line Valves, NPS 2-1/2 and Larger: Plug valve or general-duty valve.

3.4 PIPING INSTALLATION

- A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.
- B. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.
 - 1. Above-Ceiling Locations: All welded gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
 - 2. In Walls: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 may be installed in masonry walls, subject to approval of authorities having jurisdiction.
 - 3. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - a. Exception: Accessible above-ceiling space specified above.
- C. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.
 - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.
- D. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels, unless indicated to be exposed to view.
- E. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.

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- F. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- G. Connect branch piping from top or side of horizontal piping.
- H. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- I. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.
- J. Install flanges on valves, specialties, and equipment having NPS 2-1/2 and larger connections.
- K. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 23 Section "Hangers and Supports" for pipe hanger and support devices.
- B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.
 - 5. NPS 4 and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

3.6 CONNECTIONS

- A. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.
- B. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.
- C. Ground equipment.

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1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
2. Do not use gas pipe as grounding electrode.

3.7 FIELD QUALITY CONTROL

- A. Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging," and requirements of authorities having jurisdiction.

END OF SECTION 221194

SECTION 221410 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes plumbing fixtures and related components.

1.3 DEFINITIONS

- A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- B. Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.
- C. Regulatory Requirements: Comply with requirements in U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about plumbing fixtures for people with disabilities.

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- D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Hand Sinks: NSF 2 construction.
 - 2. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
 - 3. Stainless-Steel Fixtures Other Than Service Sinks: ASME A112.19.3M.
 - 4. Vitreous-China Fixtures: ASME A112.19.2M.
 - 5. Water-Closet, Flushometer Tank Trim: ASSE 1037.
- H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
 - 1. Hose-Connection Vacuum Breakers: ASSE 1011.
 - 2. Hose-Coupling Threads: ASME B1.20.7.
 - 3. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
 - 4. Pipe Threads: ASME B1.20.1.
 - 5. Supply and Drain Fittings: ASME A112.18.1M.

1.5 COORDINATION

- A. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

PART 2 - PRODUCTS

2.1 FIXTURES AND TRIM

- A. Refer to plumbing drawing for plumbing fixture schedule. Provide as specified or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

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- A. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.
- B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FIXTURE INSTALLATION

- A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-hanging fixtures with tubular waste piping attached to supports.
- F. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.
- G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball, gate, or globe valve if stops are not specified with fixture. Refer to Division 22 Section "Valves" for general-duty valves.
- H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- I. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- J. Install toilet seats on water closets.

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- K. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- L. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.
- M. Install traps on fixture outlets.
- N. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for escutcheons.
- O. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division 7 Section "Joint Sealants" for sealant and installation requirements.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect water supplies from water distribution piping to fixtures.
- C. Connect drain piping from fixtures to drainage piping.
- D. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.
- E. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.
- F. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Verify that installed fixtures are categories and types specified for locations where installed.

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- B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow and stream.
- C. Replace washers and seals of leaking and dripping faucets and stops.

3.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.

3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 221410

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SECTION 221430 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following plumbing specialties:
 - 1. Backflow preventers.
 - 2. Cleanouts.
 - 3. Floor drains.

1.3 DEFINITIONS

- A. The following are industry abbreviations for plastic piping materials:
 - 1. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Domestic Water Piping: 125 psig.
 - 2. Sanitary Waste and Vent Piping: 10-foot head of water.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.

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- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 BACKFLOW PREVENTERS

- A. Manufacturers:
 - 1. Ames Co., Inc.
 - 2. B & K Industries, Inc.
 - 3. Cla-Val Co.
 - 4. CMB Industries, Inc.; Febco Backflow Preventers.
 - 5. Conbraco Industries, Inc.
 - 6. FLOMATIC Corp.
 - 7. IMI Cash Valve.
 - 8. Mueller Co.; Hersey Meters Div.
 - 9. Sparco, Inc.
 - 10. Watts Industries, Inc.; Water Products Div.
 - 11. Zurn Industries, Inc.; Wilkins Div.
- B. General: ASSE standard, backflow preventers.
 - 1. NPS 2 and Smaller: Bronze body with threaded ends.
 - 2. NPS 2-1/2 and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends.
 - a. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.
 - 3. Interior Components: Corrosion-resistant materials.
 - 4. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.

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5. Strainer: On inlet, if indicated.
- C. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.
- D. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with nonremovable and manual drain features, and ASME B1.20.7, garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.
- E. Intermediate Atmospheric-Vent Backflow Preventers: ASSE 1012, suitable for continuous pressure application. Include inlet screen and two independent check valves with intermediate atmospheric vent.
- F. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2 air-gap fitting located between two positive-seating check valves.
 1. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
- G. Double-Check Backflow Prevention Assemblies: ASSE 1015, suitable for continuous pressure application. Include shutoff valves on inlet and outlet, and strainer on inlet; test cocks; and two positive-seating check valves.
 1. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
- H. Antisiphon-Pressure-Type Vacuum Breakers: ASSE 1020, suitable for continuous pressure application. Include shutoff valves, spring-loaded check valve, spring-loaded floating disc, test cocks, and atmospheric vent.
 1. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
- I. Dual-Check-Valve-Type Backflow Preventers: ASSE 1024, suitable for continuous pressure application. Include union inlet and two independent check valves.
- J. Dual-Check-Valve-Type Backflow Preventers: ASSE 1032, suitable for continuous pressure application for carbonated beverage dispensers. Include stainless-steel body; primary and secondary checks; ball check; intermediate atmospheric-vent port for relieving carbon dioxide; and threaded ends, NPS 3/8.
- K. Hose-Connection Backflow Preventers: ASSE 1052, suitable for at least 3-gpm flow and applications with up to 10-foot head of water back pressure. Include two check valves; intermediate atmospheric vent; and nonremovable, ASME B1.20.7, garden-hose threads on outlet.

2.3 MISCELLANEOUS PIPING SPECIALTIES

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- A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, piston type with pressurized metal-tube cushioning chamber. Sizes indicated are based on ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.
1. Manufacturers:
 - a. Amtrol, Inc.
 - b. Josam Co.
 - c. Precision Plumbing Products, Inc.
 - d. Sioux Chief Manufacturing Co., Inc.
 - e. Watts Industries, Inc.; Drainage Products Div.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
- B. Hose Bibbs: Refer to plumbing drawing Plumbing Fixture Schedule.
- C. Deep-Seal Traps: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap seal primer valve connection.
1. NPS 2: 4-inch- minimum water seal.
 2. NPS 2-1/2 and Larger: 5-inch- minimum water seal.
- D. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.
- E. Fixed Air-Gap Fittings: Manufactured cast-iron or bronze drainage fitting with semiopen top with threads or device to secure drainage inlet piping in top and bottom spigot or threaded outlet larger than top inlet. Include design complying with ASME A112.1.2 that will provide fixed air gap between installed inlet and outlet piping.
- F. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
- G. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.
- H. Vent Terminals: Commercially manufactured, shop- or field-fabricated, frost-proof assembly constructed of galvanized steel, copper, or lead-coated copper. Size to provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.
- I. Expansion Joints: assembly with cast-iron body with bronze sleeve, packing gland, and packing; of size and end types corresponding to connected piping.

2.4 CLEANOUTS

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- A. Refer to plumbing drawing Plumbing Fixture Schedule.

2.5 FLOOR DRAINS

- A. Refer to plumbing drawing Plumbing Fixture Schedule.

2.6 ACCESS DOORS

- A. Provide wall mounted access doors for trap primers and water hammer arrestors.
- B. Access doors shall be by "Elmdor Stoneman" or approved equal. Access doors shall be all stainless-steel construction with hex cam latch lock system. The door shall include a closed cell neoprene gasket. Door shall have concealed pin hinges.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Section 231050 "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
- B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
 - 1. Locate backflow preventers in same room as connected equipment or system.
 - 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
 - 3. Do not install bypass piping around backflow preventers.
- C. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet.
- D. Install strainers on supply side of each control valve, pressure regulator, and solenoid valve.
- E. Install expansion joints on vertical risers, stacks, and conductors if indicated.
- F. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

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1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.
 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 4. Locate at base of each vertical soil and waste stack.
- G. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.
- H. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.
- I. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
- J. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.
- K. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.
- L. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
1. Position floor drains for easy access and maintenance.
 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

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- B. Install piping adjacent to equipment to allow service and maintenance.
- C. Connect plumbing specialties to piping specified in other Division 22 Sections.
- D. Ground equipment.
- E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- F. Connect plumbing specialties and devices that require power according to Division 16 Sections.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4-lb/sq. ft., 0.0625-inch thickness or thinner.
 - 2. Copper Sheets: Solder joints of copper sheets.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 7 Section "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.
- G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 FIELD QUALITY CONTROL

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- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled and their installation, including piping and electrical connections. Report results in writing.
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221430

SECTION 221485 - DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following for domestic water systems:
 - 1. Gas fired water heaters.
 - 2. Compression tanks.
 - 3. Accessories.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain same type of water heaters through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of water heaters and are based on specific units indicated. Other manufacturers' products complying with requirements may be considered. Refer to Division 1 Section "Substitutions."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. ASME Compliance: Fabricate and label water heater, hot-water storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.
- E. ASHRAE Standards: Comply with performance efficiencies prescribed for the following:
 - 1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

1.4 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

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- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include heating elements and storage tanks.
 - 2. Warranty Period: From date of Substantial Completion:
 - a. Heating Elements: 1 year.
 - b. Storage Tanks: 6 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 GAS FIRED WATER HEATERS

- A. Gas water heater(s) shall be State or equal, minimum 95% thermal efficiency, and a maximum hydrostatic working pressure of 160 PSI.
- B. Water heater shall have modulating gas burner that automatically adjusts the input based on demand; powered anodes that are non-sacrificial and maintenance free, seamless glass-lined steel tank construction, with glass lining applied to all water-side surfaces after the tank has been assembled and welded; meets the thermal efficiency and/or standby loss requirements of the U. S. Department of Energy and current edition of ASHRAE/IES 90.1, foam insulation and a CSA Certified and ASME rated T&P relief valve; a down-fired power burner designed for precise mixing of air and gas for optimum efficiency, requiring no special calibration on start-up; be approved for 0" clearance to combustibles on sides and rear and 1-1/2" on top.
- C. The control shall be an integrated solid-state temperature and ignition control device with integral diagnostics, graphical user interface, fault history display, and shall have digital temperature readout.
- D. All models are design certified by Underwriters Laboratories (UL), Inc., according to ANSI Z21.10.3 - CSA 4.3 standards governing storage type water heaters; meet the thermal efficiency and standby loss requirements of the U. S. Department of Energy and current edition ASHRAE/IES 90.1. Complies with SCAQMD Rule 1146.2 and other air quality management districts with similar requirements for low NOx emissions.

2.3 WATER HEATER ACCESSORIES

- A. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated, steel bracket for wall mounting and capable of supporting water heater and water.

PART 3 - EXECUTION

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3.1 WATER HEATER INSTALLATION

- A. Install water heaters, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- B. Install instantaneous water heaters in accordance with manufacturer's instructions.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Make connections with dielectric fittings where piping is made of dissimilar metal.
- D. Electrical Connections: Power wiring and disconnect switches are specified in Division 26 Sections. Arrange wiring to allow unit service.
- E. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Engage a factory-authorized service representative to perform startup service.
- B. In addition to manufacturer's written installation and startup checks, perform the following:
 - 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 2. Verify that piping system tests are complete.
 - 3. Check for piping connection leaks.
 - 4. Check for clear relief valve inlets, outlets, and drain piping.
 - 5. Test operation of safety controls, relief valves, and devices.
 - 6. Energize electric circuits.
 - 7. Adjust operating controls.
 - 8. Adjust hot-water-outlet temperature settings. Do not set above 140 deg F (60 deg C) unless piping system application requires higher temperature.

END OF SECTION 221485

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SECTION 231050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections.
 1. Piping materials and installation instructions common to most piping systems.
 2. Escutcheons.
 3. Dielectric fittings.
 4. Flexible connectors.
 5. Mechanical sleeve seals.
 6. Equipment nameplate data requirements.
 7. Nonshrink grout for equipment installations.
 8. Field-fabricated metal and wood equipment supports.
 9. Installation requirements common to equipment specification sections.
 10. Cutting and patching.
 11. Touchup painting and finishing.
 12. Excavation.
- B. Pipe and pipe fitting materials are specified in Division 22 piping system Sections.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

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- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.5 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
- E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces.

1.6 EXCAVATION

- A. Trenching:
 - 1. Perform all excavating of every description and of whatever substance encountered to depths indicated or specified. Pile materials suitable for backfilling a sufficient distance from banks of trenches to prevent slides or cave-ins. Comply with OSHA requirements for excavation, trenching and shoring.

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Pile excavated material suitable for backfilling on one side only of trenches in such a manner as to permit ready access to and use of existing fire hydrants, valves, manholes and other utilities system apparatus and a sufficient distance from banks of trenches to prevent slides or cave-ins. Keep surface drainage of adjoining areas unobstructed. Waste all excavated materials not required or satisfactory for backfill. Remove water by pumping or other approved methods, and discharge at a safe distance from the excavation.

2. Provide trenches of necessary width for proper laying of pipe and comply with latest publication of OSHA 2226 Excavating and Trenching Operations. Coordinate trench excavation with pipe installation to avoid open trenches for prolonged periods. Accurately grade bottoms of trenches to provide uniform bearing, and support for each section of pipe on undisturbed soil or the required thickness of bedding material at every point along its entire length.
3. Provide at least 12 inches in the clear between their outer surfaces and the embankment or shoring which may be used when excavating for manholes and similar structures. Remove unstable soil that is incapable of supporting the structure in the bottom of the excavation to the depth necessary to obtain design bearing.
4. Material to be excavated is "unclassified." No adjustment in the contract price will be made on account of the presence or absence of rock, shale, masonry or other materials.
5. Protect existing utility lines that are indicated or the locations of which are made known to the Contractor prior to excavating and trenching and that are to be retained, as well as utility lines constructed during excavating and trenching operations, from damage during excavating, trenching and backfilling; and if damaged, repair the lines at no additional compensation. Issue notices when utility lines that are to be removed are encountered within the area of operations in ample time for the necessary measures to be taken to prevent interruption of the service.
6. Provide trenches for utilities of a depth that will provide the following minimum depths of cover from existing grade or from indicated finish grades, whichever is lower:
 - a. 1 Foot Minimum Cover: Sanitary sewer, storm drainage, industrial waste.
 - b. 2 Foot Minimum Cover: Domestic water, fire line.

B. Backfilling:

1. Backfill all trenches after piping, fittings and joints have been tested and approved.
2. Backfill trenches with sand to provide 6 inches sand below conduit and 12 inches sand cover. Backfill remainder of trenches with satisfactory materials consisting of earth, loam, sandy clay, sand, and gravel, or soft shale, free from large clods of earth and stones not over 1 ½ inch in size, and deposit in 9 inch maximum layers, loose depth as indicated or specified. Take care not to damage utility lines. Deposit the remainder of backfill materials in the trench in 1 foot maximum layers, and compact by mechanical means. Re-open trenches and excavation pits improperly backfilled or where settlement occurs to the depth required to obtain

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the specified compaction, then refill and compact with the surface restored to the required grade and compaction.

3. Backfill trench utility line with sand backfill material in 6 inch layers where trenches cross streets, driveways, building slabs, or other pavements. Moisten each layer and compact to 95 percent modified proctor of the maximum soil density as determined by ASTM D1557. Accomplish backfilling in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value so that paving of the area can proceed immediately after backfilling is complete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Dielectric Unions:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Co.
 - c. Eclipse, Inc.; Rockford-Eclipse Div.
 - d. Epco Sales Inc.
 - e. Hart Industries International, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
 2. Dielectric Couplings:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
 3. Mechanical Sleeve Seals:
 - a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Thunderline/Link-Seal.

2.2 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

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2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32.
1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
 2. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.
 3. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10 percent maximum lead content.
 4. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10 percent maximum lead content.
 5. Alloy Sb5: 95 percent tin and 5 percent antimony, with 0.20 percent maximum lead content.
- F. Brazing Filler Metals: AWS A5.8.
1. BCuP Series: Copper-phosphorus alloys.
 2. BAg1: Silver alloy.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements: Manufacturer's standard solvent cements for the following:
1. ABS Piping: ASTM D 2235.
 2. CPVC Piping: ASTM F 493.
 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 4. PVC to ABS Piping Transition: ASTM D 3138.
- I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.
- J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.
- K. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
1. Sleeve: ASTM A 126, Class B, gray iron.
 2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
 3. Gaskets: Rubber.
 4. Bolts and Nuts: AWWA C111.
 5. Finish: Enamel paint.

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2.3 DIELECTRIC FITTINGS

- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
- B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.
- D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

2.4 FLEXIBLE CONNECTORS

- A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:
 - 1. 2-Inch NPS and Smaller: Threaded.
 - 2. 2-1/2-Inch NPS and Larger: Flanged.
 - 3. Option for 2-1/2-Inch NPS and Larger: Grooved for use with keyed couplings.
- B. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.
- C. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

2.5 MECHANICAL SLEEVE SEALS

- A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.6 PIPING SPECIALTIES

- A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
 - 1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
 - 2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.

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3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
 5. PVC: Manufactured, permanent, with nailing flange for attaching to wooden forms.
 6. PVC Pipe: ASTM D 1785, Schedule 40.
 7. PE: Manufactured, reusable, tapered, cup shaped, smooth outer surface, with nailing flange for attaching to wooden forms.
- B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.
1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
 2. OD: Completely cover opening.
 3. Stamped Steel: One piece, with set screw and chrome-plated finish.
 4. Cast-Iron Floor Plate: One-piece casting.

2.7 IDENTIFYING DEVICES AND LABELS

- A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 22 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.
- B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.
1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
 2. Location: Accessible and visible location.
- C. Stencils: Standard stencils, prepared for required applications with letter sizes complying with recommendations of ASME A13.1 for piping and similar applications, but not less than 1-1/4-inch- high letters for ductwork and not less than 3/4-inch- high letters for access door signs and similar operational instructions.
1. Material: Brass.
 2. Stencil Paint: Standard exterior-type stenciling enamel; black, unless otherwise indicated; either brushing grade or pressurized spray-can form and grade.
 3. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ASME A13.1 for colors.
- D. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl, complying with ASME A13.1.

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- E. Plastic Duct Markers: Manufacturer's standard color-coded, laminated plastic. Comply with the following color code:
1. Green: Cold air.
 2. Yellow: Hot air.
 3. Yellow/Green or Green: Supply air.
 4. Blue: Exhaust, outside, return, and mixed air.
 5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
 6. Nomenclature: Include the following:
 - a. Direction of airflow.
 - b. Duct service.
 - c. Duct origin.
 - d. Duct destination.
 - e. Design cubic feet per minute.
- F. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.
1. Fabricate in sizes required for message.
 2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
 3. Punch for mechanical fastening.
 4. Thickness: 1/16 inch, unless otherwise indicated.
 5. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
- G. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
1. Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."
- H. Metal Tags: Brass with stamped letters; Tag size minimum 1-1/2 inch diameter with smooth edges.

2.8 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 2. Design Mix: 5000-psi, 28-day compressive strength.
 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 22 piping Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
- C. Install piping at indicated slope.
- D. Install components with pressure rating equal to or greater than system operating pressure.
- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.
- L. Install couplings according to manufacturer's written instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
 - 1. Uninsulated Piping Wall Escutcheons: Stamped steel, with set screw.
 - 2. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 - 3. Insulated Piping: Stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
 - 4. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

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- N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 2. Build sleeves into new walls and slabs as work progresses.
 3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
 - b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.
 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.
 5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.
- O. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.
 3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- P. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Section "Firestopping" for materials.
- R. Verify final equipment locations for roughing-in.

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- S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- T. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
 4. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube."
 5. Soldered Joints: Construct joints according to CDA's "Copper Tube Handbook."
 6. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 7. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 8. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
 9. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
- U. Piping Connections: Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
 2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.

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3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

3.3 LABELING AND IDENTIFYING

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 1. Plastic markers, with application systems. Install on insulation segment if required for hot, uninsulated piping.
 2. Locate pipe markers as follows if piping is exposed in finished spaces, machine rooms, and accessible maintenance spaces, such as shafts, tunnels, plenums, and exterior nonconcealed locations:
 - a. Near each valve and control device.
 - b. Near each branch, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, if flow pattern is not obvious.
 - c. Near locations if pipes pass through walls, floors, ceilings, or enter nonaccessible enclosures.
 - d. At access doors, manholes, and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
 - f. Spaced at maximum of 50-foot intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.
 - g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.
- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of mechanical equipment.
 1. Lettering Size: Minimum 1/4-inch- high lettering for name of unit if viewing distance is less than 24 inches, 1/2-inch- high lettering for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.

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2. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows, showing duct system service and direction of flow.
 1. Location: In each space, if ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet.
- D. Adjusting: Relocate identifying devices as necessary for unobstructed view in finished construction.
- E. Valves: Identify valves in main and branch piping with metal tags. Install metal tags with corrosive – resistant chain and “J-Hook”.

3.4 PAINTING AND FINISHING

- A. Do not paint piping specialties with factory-applied finish.
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

3.6 GROUTING

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

END OF SECTION 231050

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SECTION 231060 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes hangers and supports for mechanical system piping and equipment.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.
- B. Terminology: As defined in MSS SP-58, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

- A. Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design and obtain approval from authorities having jurisdiction for seismic restraint hangers and supports for piping and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.
 - 1. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
 - 2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

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- B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
 - 1. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
 - 2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

2.2 MISCELLANEOUS MATERIALS

- A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- C. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.
- D. Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.
 - 1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
 - 2. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 3. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Comply with MSS SP-58 for pipe hanger selections and applications.
- B. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
 - 3. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 - 4. U-Bolts (MSS Type 24): For support of heavy pipe, NPS 1/2 to NPS 30.

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5. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
- C. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- D. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
- E. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
- F. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density, 100-psi minimum compressive-strength, water-repellent-treated calcium silicate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.

3.2 HANGER AND SUPPORT INSTALLATION

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- A. Pipe Hanger and Support Installation: Comply with MSS SP-58 and MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.
 - 1. Field assemble and install according to manufacturer's written instructions.
- C. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-58. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- D. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
- E. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.
- J. Insulated Piping: Comply with the following:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.9.

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2. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.

3.3 METAL FABRICATION

- A. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.4 PAINTING

- A. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section "Painting."
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 231060

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SECTION 231081 - DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes semirigid and flexible duct, plenum, and breeching insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

1.4 SCHEDULING

- A. Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Mineral-Fiber Insulation:
 - a. CertainTeed Manson.
 - b. Knauf FiberGlass GmbH.
 - c. Owens-Corning Fiberglas Corp.
 - d. Schuller International, Inc.

2.2 INSULATION MATERIALS

A. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

2.3 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd..

1. Tape Width: 4 inches.

B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:

1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch thick.
2. Galvanized Steel: 0.005 inch thick.
3. Aluminum: 0.007 inch thick.
4. Brass: 0.010 inch thick.
5. Nickel-Copper Alloy: 0.005 inch thick.

C. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.

D. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.

1. Welded Pin Holding Capacity: 100 lb for direct pull perpendicular to the attached surface.

2.4 VAPOR RETARDERS

- A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.2 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.
- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each duct system.
- C. Apply multiple layers of insulation with longitudinal and end seams staggered.
- D. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- E. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- F. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- G. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.
- H. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.
 - 3. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.

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- I. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
 - 1. Seal penetrations with vapor-retarder mastic.
 - 2. Apply insulation for exterior applications tightly joined to interior insulation ends.
 - 3. Seal insulation to roof flashing with vapor-retarder mastic.
- J. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.
- K. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.

3.3 MINERAL-FIBER INSULATION APPLICATION

- A. Blanket Applications for Ducts and Plenums: Secure blanket insulation with adhesive and anchor pins and speed washers.
 - 1. Apply adhesives according to manufacturer's recommended coverage rates per square foot, for 100 percent coverage of duct and plenum surfaces.
 - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - 3. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches. Space 16 inches o.c. each way, and 3 inches maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
 - c. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - 4. Impale insulation over anchors and attach speed washers.
 - 5. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch staples, 1 inch o.c., and cover with pressure-sensitive tape having same facing as insulation.
 - 6. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply insulation on round duct elbows with individually mitered gores cut to fit the elbow.
 - 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch-wide strips of the same material used to insulate duct. Secure

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on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches o.c.

8. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

3.4 DUCT SYSTEM APPLICATIONS

- A. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 1. Metal ducts with duct liner.
 2. Factory-insulated flexible ducts.
 3. Flexible connectors.
 4. Vibration-control devices.
 5. Testing agency labels and stamps.
 6. Nameplates and data plates.
 7. Access panels and doors in air-distribution systems.

3.5 INDOOR DUCT APPLICATION SCHEDULE

- A. Service: Round, and rectangular supply-air ducts, and return-air concealed.
 1. Material: Mineral-fiber blanket.
 2. Thickness: 1-1/2 inch.
- B. Service: round and rectangular supply-air ducts, exposed.
 1. Material: Mineral-fiber blanket.
 2. Thickness: 1-inch (minimum).
- C. Service: Round and rectangular exhaust-air ducts, concealed and exposed, within 10-feet of roof or wall penetration.
 1. Material: Mineral-fiber blanket.
 2. Thickness: 1-inch (minimum).

END OF SECTION 231081

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SECTION 231083 - PIPE INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes preformed, rigid and flexible pipe insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

1.4 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports."
- B. Coordinate clearance requirements with piping Installer for insulation application.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Mineral-Fiber Insulation:
 - a. CertainTeed Manson.
 - b. Knauf FiberGlass GmbH.
 - c. Owens-Corning Fiberglas Corp.
 - d. Schuller International, Inc.
 2. Cellular-Glass Insulation:
 - a. Pittsburgh-Corning Corp.

2.2 INSULATION MATERIALS

- A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:
1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
 2. Blanket Insulation: Comply with ASTM C 553, Type II, without facing.
 3. Fire-Resistant Adhesive: Comply with MIL-A-3316C in the following classes and grades:
 - a. Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
 - b. Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.
 4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
 5. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.
 6. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C 196.
 7. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
- B. Cellular-Glass Insulation: Inorganic, foamed or cellulated glass, annealed, rigid, hermetically sealed cells, incombustible.

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1. Preformed Pipe Insulation, without Jacket: Comply with ASTM C 552, Type II, Class 1.
2. Preformed Pipe Insulation, with Jacket: Comply with ASTM C 552, Type II, Class 2.

2.3 FIELD-APPLIED JACKETS

- A. General: ASTM C 921, Type 1, unless otherwise indicated.
- B. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
- C. Aluminum Jacket: Factory cut and rolled to indicated sizes. Comply with ASTM B 209, 3003 alloy, H-14 temper.

2.4 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd..
 1. Tape Width: 4 inches.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
 1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch thick.
 2. Galvanized Steel: 0.005 inch thick.
 3. Aluminum: 0.007 inch thick.
 4. Brass: 0.010 inch thick.
 5. Nickel-Copper Alloy: 0.005 inch thick.
- C. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

3.2 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.
- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- G. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- H. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.
 - 1. Apply insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor retarders are indicated, extend insulation on anchor legs at least 12 inches from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
 - 3. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.
- J. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- K. Apply adhesives and mastics at the manufacturer's recommended coverage rate.

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- L. Apply insulation with integral jackets as follows:
1. Pull jacket tight and smooth.
 2. Circumferential Joints: Cover with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches o.c.
 3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.
 4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.
- M. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
1. Seal penetrations with vapor-retarder mastic.
 2. Apply insulation for exterior applications tightly joined to interior insulation ends.
 3. Extend metal jacket of exterior insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal metal jacket to roof flashing with vapor-retarder mastic.
- N. Exterior Wall Penetrations: For penetrations of below-grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor-retarder mastic.
- O. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.
- P. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.
1. Firestopping and fire-resistive joint sealers are specified in Division 7 Section "Firestopping."

3.3 MINERAL-FIBER INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:

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1. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet to form a vapor retarder between pipe insulation segments.
3. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

B. Apply insulation to fittings and elbows as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, or glass-fiber blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
3. Cover fittings with standard PVC fitting covers.

C. Apply insulation to valves and specialties as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded insulation sections are not available, apply glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.
3. Apply insulation to flanges as specified for flange insulation application.
4. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.

3.4 CELLULAR-GLASS INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Secure each layer of insulation to pipe with wire, tape, or bands without deforming insulation materials.
2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic.
3. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches o.c.

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4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

B. Apply insulation to fittings and elbows as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded sections of insulation are not available, apply mitered sections of cellular-glass insulation. Secure insulation materials with wire, tape, or bands.
3. Cover fittings with standard PVC fitting covers.

C. Apply insulation to valves and specialties as follows:

1. Apply premolded segments of cellular-glass insulation or glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.
2. Apply insulation to flanges as specified for flange insulation application.
3. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.

3.5 FIELD-APPLIED JACKET APPLICATION

A. Apply glass-cloth jacket, where indicated, directly over bare insulation or insulation with factory-applied jackets.

1. Apply jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch-thick coats of jacket manufacturer's recommended adhesive.
3. Completely encapsulate insulation with jacket, leaving no exposed raw insulation.

B. Foil and Paper Jackets: Apply foil and paper jackets where indicated.

1. Draw jacket material smooth and tight.
2. Apply lap or joint strips with the same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Apply jackets with 1-1/2-inch laps at longitudinal seams and 3-inch-wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-retarder mastic.

C. Apply metal jacket where indicated, with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with

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weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.6 FINISHES

- A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of the insulation manufacturer's recommended protective coating.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

3.7 PIPING SYSTEM APPLICATIONS

- A. Insulation materials and thicknesses are specified in schedules at the end of this Section.
- B. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 - 1. Flexible connectors.
 - 2. Vibration-control devices.
 - 3. Fire-suppression piping.
 - 4. Below-grade piping, unless otherwise indicated.
 - 5. Chrome-plated pipes and fittings, unless potential for personnel injury.
 - 6. Unions, strainers, check valves, plug valves, and flow regulators.

3.8 INSULATION APPLICATION SCHEDULE

- A. Service: Domestic hot water & Hydronic Heating:
 - 1. Operating Temperature: 60 to 140 deg F.
 - 2. Insulation Material: Mineral fiber.
 - 3. Insulation Thickness: Apply the following insulation thicknesses:
 - a. Copper Pipe: 1 ½" and smaller, see schedule on sheet P1.0.
 - b. Copper Pipe: 2" to 4", see schedule on sheet P1.0.
 - 4. Finish: None.
- B. Service: Exposed tailpiece, P-trap, and domestic hot water supplies and stops for fixtures for the disabled.
 - 1. Operating Temperature: 35 to 120 deg F.
 - 2. Insulation Material: Flexible elastomeric.
 - 3. Insulation Thickness: 1 ½" thickness.
 - 4. Field-Applied Jacket: PVC P-trap and supply covers.

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5. Vapor Retarder Required: No.
6. Finish: None.

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SECTION 231110 - VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes valves for building services piping.

1.3 REFERENCES

- A. AGA Z21.22 – Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- B. ASME B16.3 – Malleable Iron Threaded Fittings.
- C. AWS – Welding and Brazing Qualifications.
- D. MSS SP - 67 – Butterfly Valves.
- E. MSS SP - 71 – Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- F. MSS SP – 78 – Cast Iron Plug Valves, Flanged and Threaded Ends.
- G. MSS SP – 80 – Bronze Gate, Globe, Angle and Check Valves.
- H. MSS SP – 85 – Cast Iron Globe & Angle Valves, Flanged and Threaded Ends.
- I. MSS SP – 110 – Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain valves of same type through one source from a single manufacturer.
- B. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

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1.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.

1.6 WARRANTY

- A. Provide five year manufacturer warranty for valves excluding packing.

1.7 EXTRA MATERIALS

- A. Supply two packing kits for each size valve.

PART 2 - PRODUCTS

2.1 GATE VALVES

- A. Up to and Including 3 inches: MSS SP – 80, bronze body, bronze trim, rising stem, hand-wheel, inside screw, solid wedge disc, threaded ends.
- B. 2 inches and Larger: MSS SP – 70, iron body, bronze trim, outside screw and yoke, hand-wheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.2 GLOBE VALVES

- A. Up to and Including 3 inches: MSS SP – 80, bronze body, bronze trim, hand-wheel, bronze disc, threaded ends.
- B. 2 inches and Larger: MSS SP – 85, iron body, bronze trim, outside screw and yoke, hand-wheel, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.3 BALL VALVES

- A. Construction, 4 inches and Smaller: MSS SP – 110, bronze, two piece body, chrome plated brass ball, regular port, Teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded ends with union.

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2.4 PLUG VALVES

- A. Construction 2 ½ inches and Larger: MSS SP – 78, cast iron body and plug, pressure lubricated, Teflon or Buna N packing, flanged ends. Provide lever operator with setscrew.

2.5 BUTTERFLY VALVES

- A. Construction 1 ½ inches and Larger: MSS SP – 67, cast or ductile iron body. Aluminum bronze disc, resilient replaceable Buna N seat, grooved ends, extended neck, 10 position lever handle. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.6 SWING CHECK VALVES

- A. Up To and Including 3 inches.
 - 1. MSS SP-80 bronze body and cap, bronze swing disc with rubber seat, threaded ends.
- B. 2 inches and Larger:
 - 1. MSS SP – 71, iron body, bronze swing disc, renewable disc seal and seat ends.

2.7 SPRING LOADED CHECK VALVES

- A. Construction: Class 125 or Class 150, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.8 WATER PRESSURE REDUCING VALVES

- A. Up to 2 inches:
 - 1. Construction: MSS SP – 80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded ends.
- B. Over 2 inches:
 - 1. Construction: MSS SP – 85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

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2.9 RELIEF VALVES

A. Pressure Relief:

1. Construction: AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

B. Temperature and Pressure Relief:

1. Construction: AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME SEC IV certified and labeled.

2.10 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe 2 inches and Under:

1. Ferrous Piping: 150 psig malleable iron, threaded.
2. Copper Piping: Bronze.

B. Flanges for Pipe Over 2 inches:

1. Ferrous Piping: 150 psig forged steel, slip-on.
2. Copper Piping: Bronze.

C. Gaskets: 1/16 inch thick preformed neoprene.

D. Grooved and Shouldered Pipe End Couplings:

1. Housing Clamps: Malleable iron to engage and lock designed to permit some angular deflection, contraction, and expansion.
2. Sealing Gasket: C-shape elastomer composition for operating temperature range from minus 30 degrees F to 230 degrees F.

E. Accessories: Steel bolts, nuts, and washers.

F. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify Piping System is ready for installation.

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3.2 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Install valves with stems upright or horizontal, not inverted.
- C. Use grooved mechanical couplings and fasteners only in accessible locations.
- D. Install unions downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- E. Install gate, ball, or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- F. Install globe, ball or butterfly valves for throttling, bypass, or manual flow control services.
- G. Provide plug valves in natural, [propane] gas systems for shut-off service.
- H. Use lug end butterfly valves to isolate equipment.
- I. Use ¾ inch gate, ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

3.3 INTERFACE WITH OTHER PRODUCTS

- A. Conform to applicable piping specification for hangers and insulation.

END OF SECTION 231110

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SECTION 231782 - HVAC UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the heating and cooling units.
- B. Related Requirements:
 - 1. Division 01 Section "General Commissioning Requirements" for coordination of commissioning requirements of HVAC systems, assemblies, equipment and components.

1.3 SUBMITTALS

- A. Product Data: Include manufacturer's technical data for each model indicated, including rated capacities of selected model clearly indicated; dimensions; required clearances; shipping, installed, and operating weights; furnished specialties; accessories; and installation and startup instructions.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
- C. Maintenance Data: For equipment to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- B. Energy Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

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- C. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
- E. Comply with AGA Z223.1 for gas-fired furnace section.
- F. Comply with NFPA 70.

1.5 COORDINATION

- A. Coordinate installation of roof equipment supports, and roof penetrations with roof construction.

1.6 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: A written warranty, executed by the manufacturer and signed by the Contractor, agreeing to replace components that fail in materials or workmanship, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.
 - 1. Warranty Period, Compressors: Manufacturers standard, but not less than 5 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide rooftop A/C units manufactured by Carrier or approved equal.

2.2 MANUFACTURERS

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- A. Subject to compliance with requirements, provide units manufactured by First Company or approved equal.

2.3 INDOOR HEATING FAN COIL UNIT

- A. Unit Cabinet shall be factory assembled for horizontal ceiling mount configuration, fully insulated with matching solid ceiling panel, two speed fan operation, high efficient copper tubing with aluminum fins for the heating coil, built-in hot water pump, and 80% efficient (MERV 13) air filters.
- B. Evaporator coils shall be 3/8" internally enhanced copper tube mechanically bonded to lanced aluminum plate fins with dual circuit interlaced/intertwined, factory pressure and leak tested to 449 PSIG, draw through air flow system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roof for compliance with requirements for conditions affecting installation and performance of rooftop units. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. All openings are to be covered during storage and rough installation to reduce dust and debris collection.
- B. Install units according to manufacturer's written instructions.
- C. Install units level and plumb, maintaining manufacturer's recommended clearances.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties. The following are specific connection requirements:
 - 1. Install piping to allow service and maintenance.
- B. Electrical: Conform to applicable requirements in Division 16 Sections.
- C. Ground equipment.

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1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 TESTING

- A. Manufacturer shall perform an Equipment Performance Check (E.P.C.). The E.P.C. shall be conducted by a factory trained field service representative.
- B. Submit report to Owner for approval. Report shall include a list of items checked/verified and actual performance data under both heating and cooling operations.
- C. Schedule E.P.C. with manufacturer after complete installation and start-up of equipment. Give manufacturer a minimum of 2 weeks notice. System must be operational a minimum of 24 hours before E.P.C.
- D. Provide all documentation and testing required by code for building commissioning.

END OF SECTION 231782

SECTION 231815 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes rectangular and round, metal ducts for heating, ventilating, and air-conditioning systems in pressure classes from minus 2- to plus 10-inch wg.

1.3 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

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2.2 DUCT LINER

- A. General: Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard."
- B. Materials: ASTM C 1071 with coated surface exposed to airstream to prevent erosion of glass fibers.
 - 1. Thickness: 1 inch.
 - 2. Thermal Conductivity (k-Value): 0.26 at 75 deg F mean temperature.
 - 3. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM C 411.
 - 4. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
 - 5. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.

2.3 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
 - 1. Joint and Seam Tape: 2 inches wide; glass-fiber fabric reinforced.
 - 2. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.

2.4 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.
 - 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.
 - 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.

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2. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
 1. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.

2.5 DUCT FABRICATION

- A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
 2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
- B. Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:
 1. Supply Ducts: 1-inch wg.
 2. Return Ducts: 1-inch wg, negative pressure.
 3. Exhaust Ducts: 1-inch wg, negative pressure.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION, GENERAL

- A. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.
- B. All openings are to be covered during storage and rough installation to reduce dust and debris collection.
- C. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.

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- D. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- E. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches.

3.2 SEAM AND JOINT SEALING

- A. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Pressure Classification Less Than 2-Inch wg: Transverse joints.
- C. Seal externally insulated ducts before insulation installation.

3.3 HANGING AND SUPPORTING

- A. Install rigid round and rectangular, metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- D. Install concrete inserts before placing concrete.
- E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

3.4 CONNECTIONS

- A. Connect equipment with flexible connectors according to Division 23 Section "Duct Accessories."
- B. For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

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3.5 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect the system. Vacuum ducts before final acceptance to remove dust and debris.

END OF SECTION 231815

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SECTION 231820 - DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
 - 3. Fire and smoke dampers.
 - 4. Zoning Dampers
 - 5. Turning vanes.
 - 6. Duct-mounted access doors and panels.
 - 7. Flexible ducts.
 - 8. Flexible connectors.
 - 9. Duct accessory hardware.

1.3 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with the following NFPA standards:
 - 1. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

2.2 BACKDRAFT DAMPERS

- A. Description: Suitable for horizontal or vertical installations.

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- B. Frame: 0.052-inch- thick, galvanized, sheet steel, with welded corners and mounting flange.
- C. Blades: 0.025-inch- thick, roll-formed aluminum.
- D. Blade Seals: Neoprene.
- E. Tie Bars and Brackets: Aluminum.
- F. Return Spring: Adjustable tension.

2.3 MANUAL-VOLUME DAMPERS

- A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 - 1. Pressure Classifications of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
 - 1. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized, sheet steel.
 - 3. Blade Axles: Nonferrous.
 - 4. Tie Bars and Brackets: Galvanized steel.

2.4 FIRE DAMPERS

- A. General: Labeled to UL 555.
- B. Fire Rating: One and one-half hours.
- C. Frame: SMACNA Type B with blades out of airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
- D. Mounting Sleeve: Factory- or field-installed galvanized, sheet steel.

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1. Minimum Thickness: 0.052 inch or 0.138 inch thick as indicated, and length to suit application.
2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

E. Mounting Orientation: Vertical or horizontal as indicated.

F. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized, sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized steel blade connectors.

G. Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.

H. Fusible Link: Replaceable, 165 deg F rated.

2.5 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

2.6 DUCT-MOUNTED ACCESS DOORS AND PANELS

A. General: Fabricate doors and panels airtight and suitable for duct pressure class.

B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.

C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

E. Insulation: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.7 FLEXIBLE CONNECTORS

A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

B. Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized, sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected ducts.

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2.8 FLEXIBLE DUCTS

- A. General: Comply with UL 181, Class 1.
- B. Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 2-inch- thick, glass-fiber insulation around a continuous inner liner.
 - 1. Reinforcement: Steel-wire helix encapsulated in inner liner.
 - 2. Outer Jacket: Glass-reinforced, silver Mylar with a continuous hanging tab, integral fibrous-glass tape, and nylon hanging cord.
 - 3. Outer Jacket: Polyethylene film.
 - 4. Inner Liner: Polyethylene film.
- C. Pressure Rating: 6-inch wg positive, 1-inch wg negative.

2.9 ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.
- B. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches to suit duct size.
- C. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.
- B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.
- C. Provide test holes at fan inlet and outlet and elsewhere as indicated.
- D. Install fire dampers, smoke dampers, and zoning dampers according to manufacturer's UL-approved written instructions.
 - 1. Install fusible links in fire dampers.

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- E. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.
 - 1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
 - 2. Install access panels on side of duct where adequate clearance is available.
- F. Label access doors according to Division 23 Section "Mechanical Identification."

3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire dampers, smoke dampers, and zoning dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION 231820

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SECTION 231838
POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Ceiling-mounting ventilators.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Listing: U.L. listed.

1.4 COORDINATION

- A. Coordinate size and location of structural-steel support members.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. All Ventilators:
 - a. Greenheck.
 - b. Panasonic.
 - c. Cook, Loren Company.
 - d. Penn Ventilation Companies, Inc.

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2.2 CEILING & IN-LINE VENTILATORS

- A. Description: Centrifugal fans designed for installing in ceiling
- B. Housing: Steel, lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.
- D. Grille: Plastic, louvered grille with flange on intake.
- E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- F. Accessories:
 - 1. Isolation: Rubber-in-shear vibration isolators.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power ventilators level and plumb in accordance with manufacturer's instructions.
- B. Support suspended units from structure using threaded steel rods and rubber-in-shear isolators.
- C. Install units with clearances for service and maintenance.

3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 15 Section "Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment.

END OF SECTION 231838

SECTION 231855 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

1.3 DEFINITIONS

- A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.
- B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.
- C. Register: A combination grille and damper assembly over an air opening.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Diffusers, registers, and grilles are scheduled on Drawings.

2.2 SOURCE QUALITY CONTROL

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- A. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.4 CLEANING

- A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION 231855

SECTION 231990 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

1. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
2. Balancing airflow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
3. Adjusting total HVAC systems to provide indicated quantities.
4. Measuring electrical performance of HVAC equipment.
5. Setting quantitative performance of HVAC equipment.
6. Verifying that automatic control devices are functioning properly.
7. Reporting results of the activities and procedures specified in this Section.

1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.
- C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- E. Report Forms: Test data sheets for recording test data in logical order.
- F. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- G. Test: A procedure to determine quantitative performance of a system or equipment.

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- H. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.
- I. AABC: Associated Air Balance Council.
- J. AMCA: Air Movement and Control Association.
- K. NEBB: National Environmental Balancing Bureau.
- L. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.4 QUALITY ASSURANCE

- A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC.
- B. Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing."
- C. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.
- D. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

1.5 PROJECT CONDITIONS

- A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

1.6 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

1.7 WARRANTY

- A. General Warranty: The national project performance guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

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- B. National Project Performance Guarantee: Provide a guarantee on AABC'S "National Standards" forms stating that AABC will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
 - 1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
 - 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine Architect's and Engineer's design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- D. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.
- E. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- F. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- G. Examine equipment for installation and for properly operating safety interlocks and controls.

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- H. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

3.2 PREPARATION

- A. Complete system readiness checks and prepare system readiness reports. Verify the following:
 - 1. Permanent electrical power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance and fire dampers are open.
 - 5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 6. Windows and doors can be closed so design conditions for system operations can be met.

3.3 GENERAL TESTING AND BALANCING PROCEDURES

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.
- C. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.4 FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Verify that motor starters are equipped with properly sized thermal protection.

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- E. Check dampers for proper position to achieve desired airflow path.
- F. Check for airflow blockages.
- G. Check condensate drains for proper connections and functioning.
- H. Check for proper sealing of air-handling unit components.

3.5 CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES

- A. The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems.
- B. Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer.
 - 1. Measure fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 - 2. Adjust fan speed higher or lower than design with the approval of the Architect. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 - 3. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.
- C. Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.
 - 1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submains and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

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2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submains and branch ducts to design airflows within specified tolerances.
- D. Measure terminal outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.
- E. Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than extractors and the dampers at the air terminals.
1. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer, model, and serial numbers.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating if high-efficiency motor.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.

3.7 TEMPERATURE TESTING

- A. During testing, adjusting, and balancing, report need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of 2 successive 8-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.
- C. Measure outside-air, wet- and dry-bulb temperatures.

3.8 TOLERANCES

- A. Set HVAC system airflow rates within the following tolerances:

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1. Supply, Return, and Exhaust Fans: Plus 10 or minus 5 percent.
2. Supply Air Outlets: Plus or minus 5 percent.
3. Return and Exhaust Air Inlets: Plus or minus 10 percent.

3.9 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 1. Include a list of the instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to the certified field report data, include the following:
 1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
- D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:
 1. Title page.
 2. Name and address of testing, adjusting, and balancing Agent.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of testing, adjusting, and balancing Agent who certifies the report.
 10. Summary of contents, including the following:
 - a. Design versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 11. Notes to explain why certain final data in the body of reports vary from design values.

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E. Instrument Calibration Reports: For instrument calibration, include the following:

1. Report Data: Include the following:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.10 ADDITIONAL TESTS

- A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

END OF SECTION 231990

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SECTION 26 01 00

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions and Division 1, General Requirements, apply to the work specified in this section.

1.2 DESCRIPTION OF WORK

- 1. Motors, motor controls and low voltage control wiring that are an integral part of equipment assemblies and heating and ventilation controls.
 - 2. Painting of exposed electrical work.
 - 3. Plumbing controls and low voltage wiring.
 - 4. Fire alarm system and devices.
 - 5. Data network and distribution.
 - 6. Paging/Intercom system and equipment.
 - 7. Commissioning of HVAC equipment and systems and lighting and lighting control systems including training of owner personnel.
- B. Work Included in Contract
- 1. Provide and install new 277/480v and 120/208V, 3 phase, 4 wire electrical distribution system with new distribution panels, transformers and panelboards and devices for a complete system as detailed on drawings.
 - 2. Coordinate with AT&T and Comcast for new MPOE installation.
 - 3. Grounding and bonding per NEC.
 - 4. Provide and install new exterior light poles as shown on drawings.
 - 5. Provide and install new lighting control system as shown on drawings.
 - 6. Provide complete telephone/data system connected to existing campus system per District standards as shown on drawings and specified under Division 27.
 - 7. Provide a complete VOIP paging/intercom/clock system per District standards as shown on drawings and specified under Division 27.

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8. Provide a complete new conduit and wire system for intrusion alarm system per District standards as shown on drawings and specified under Division 27.
9. Provide Video Surveillance cameras with Cat 6 cabling.
10. Provide wiring and hookup of all electrical equipment specified under other specification sections, such as technology systems, mechanical and plumbing equipment.
11. Provide complete new addressable voice evacuation fire alarm system per District standards as detailed on drawings and specifications and specified under Division 28 in new AMS modular buildings.
12. Provide complete new addressable stand alone voice evacuation fire alarm system per District standards as detailed on drawings and specifications and specified under Division 28 in new EDCC buildings.
13. Provide seismic vertical and lateral supports per 26 05 29 and Division 5 requirements.
14. Provide a complete classroom audio/visual system per District standards as shown on drawings and specified under Division 27.

1.3 CODES AND STANDARDS

- A. In addition to Codes and Standards - Division 1, the following shall apply to this Division:

National Electrical Code with California amendments
California Admin. Code, Titles 17, 19, 24, Part 1.
U.L. Electrical Construction Materials List
Codes, rules and regulations as specified hereinafter
Local city and county agencies

1.4 SUBMITTALS

- A. Submittals shall be made in conformance with the General Conditions. The list shall include, for each item, the manufacturer, manufacturer's catalog number, type of class, the rating, capacity, size, etc. Submittals shall include:

1. Switchboard and Panelboards
2. Transformers
3. Conduit & Fittings
4. Boxes & Covers
5. Fuses

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6. Wire & Cable
 7. Wiring Devices
 8. Disconnect Switches
 9. Lighting Fixtures (Note: Lighting fixtures are as noted or of a pre-approved equal. Submit photometric data along with manufacturer's information. Samples may be requested if fixture is unknown to engineer.)
 10. Lighting Control System
 11. Paging/Intercom/Clock System
 12. Telephone/Data Networking System
 13. Intrusion Alarm System
 14. Fire Alarm System
 15. Classroom Audio/Visual System
 16. Video Surveillance cameras
- B. Shop Drawings: Submit for approval, detailed construction drawings for each item of fabricated equipment required for the electrical installation. All drawings shall be to scale, fully dimensioned, and provide sufficient detail to clearly indicate the arrangement of the equipment and its component parts. Construction of the equipment shown shall be revised to comply with the drawings and specifications as required by the Architect after review of the shop drawings, and the drawings submitted when requested by the Architect. Shop drawings shall be submitted for the following:
1. Switchboard and Panelboards
 2. Transformers
 3. Lighting Systems and Controls
 4. Paging/Intercom/Clock System
 5. Telephone/Data Networking System
 6. Intrusion Alarm System
 7. Fire Alarm System
 8. Classroom Audio/Visual System
 9. Video Surveillance cameras

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- C. Substitution: Provide substitutions as outlined.

1.5 SUPERVISION OF ELECTRICAL WORK

- A. Contractor shall personally, or through an authorized and competent representative, constantly supervise the work from beginning to completion and final acceptance. So far as possible, keep same foreman and workmen throughout the project duration. Work shall be subject to inspection and approval by Architect. Promptly furnish related information when so requested by Architect.

1.6 EQUIPMENT AND SYSTEMS IDENTIFICATION

- A. General: All panels, terminal cabinets, etc., shall be labeled as to identification and use. In general, equipment shall be identified in accordance with drawings. Identification tags, signs, labels and markers shall comply with OSHA and ANSI requirements.
- B. Nameplates: All equipment, terminal cabinets, panels and systems shall be identified by laminated, engraved plastic, white on black plates permanently attached to the equipment. Voltage and phase shall be listed on these plates.
- C. All terminal cabinets to have terminal strips and all wiring in terminal cabinets shall be tagged.
- D. Directories: Provide for power circuits, typewritten, neatly arranged in numerical order, and permanently fixed inside all new and existing panels.
- E. Provide lamecoid label on all receptacle and switch covers indicating complete circuit number.
- F. Provide lamecoid label on all blank cover plates indicating circuit number or low voltage system (i.e. future data, intrusion, etc.).
- G. Provide lamecoid label on all fire alarm device covers indicating complete device number.
- H. Provide service description etched on cover of all underground pull boxes.

1.7 OPERATING INSTRUCTIONS ON-SITE

- A. At time of occupancy, arrange for manufacturer's representatives to instruct building operating and maintenance personnel in use of any equipment requiring operating and maintenance. Arrange for all personnel to be instructed at one time. Pay all costs for such service (minimum of 4 hours).

1.8 ADJACENT WORK

- A. Coordinate work and complete with others in furnishing and placing this work.

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- B. Work to approved shop drawings for work by others and to field measurements as necessary to properly fit the work.
- C. Project adjacent work as necessary; adjacent construction or exposed surfaces or surfaces damaged by use of materials or operations under this Section shall be repaired or replaced as directed by Architect.

1.9 DRAWINGS

- A. The electrical drawings, which constitute an integral part of this contract, shall serve as the working drawings. They indicate diagrammatically the general layout of the complete electrical system, including the arrangement of feeders, circuits, panelboards, service equipment, and other work. Field verifications of scale dimensions taken from the drawings are directed since actual field locations, distances and elevations will be governed by actual field conditions. Review architectural, structural, mechanical and plumbing drawings and adjust work to conform to all conditions indicated thereon. Discrepancies shown on different plans or between plans and actual field conditions, or between plans and specifications, shall promptly be brought to the attention of the Architect for a decision.

1.10 COORDINATION AND COOPERATION

- A. Drawings and specifications are both supplementary and complementary. Taken together, they are intended to define complete working installations of the systems represented, in accordance with approved practice in the trade, and in conformity with all applicable requirements of local jurisdictional offices and officers and codes and enforcing bodies.
- B. It shall be presumed that any bid offered under this Division of the Specifications is based on a careful examination of the job site, and of the plans and specifications; that the person(s) or firm(s) awarded a contract hereunder is/are experienced and qualified in the type of work represented; that every effort has been made to prepare complete, accurate and correct plans and specifications; and that reasonable diligence will be exercised in planning and scheduling the work to anticipate conflicts and/or detect errors or omissions. All such shall be immediately reported, and proper resolution agreed on between concerned parties before the work affected is performed. If due to lack of diligence, or to incompetence, failure to anticipate such problems shall not create a valid claim for extra costs or charges.
- C. Requirements of other trades, of utility companies, and of fire departments, protective services, communication systems, or other facilities of a utility nature, shall be determined prior to installation of systems, equipment, devices or materials affected by or dependent on such requirements.
- D. Unapproved deviations or changes based on a presumption of error or code violation, or work not suitable for its intended function, may not be accepted.

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- E. Nothing herein shall act to prevent or discourage the contractor from suggesting or discussing possible changes in the work where such might be beneficial to the contractor or the owner, or might facilitate the work of this or other trades.
- F. Any work resulting in a claim for a change in the contract price must be approved and fully documented.

1.11 VISIT TO SITE

- A. Visit the project site, take requisite measurements, and verify exact location of buildings, utilities, and other facilities, and obtain such other information as is necessary for an intelligent bid. No allowance will subsequently be made by the Architect or Owner for any error or omission on the part of the bidder in this connection.

1.12 RECORD DRAWINGS

- A. Record of Job Progress: Keep an accurate dimensional record of the "as-built" locations and of all work; all as required. This record shall be kept up-to-date on blue-line prints as the job progresses and shall be available for inspection at all times. It shall be reviewed by inspector prior to each monthly application for payment.
- B. Record of Installation: Refer to Supplementary General Conditions.
- C. Include on "as-built" drawings:
 - 1. Routing of all buried or concealed electrical feeders and conduits.
- D. Upon completion of the work, a completed set of as-built reproducible vellums and electronic file (ACAD 2014) on Cd/DVD disk(s) shall be delivered to the Architect.

1.13 GUARANTEE

- A. All work shall be guaranteed for a minimum period of one year from either the official date of completion or from the date of acceptance by the Owner, whichever is the later date. The guarantee period for certain items shall be longer, as indicated in the specification for those items.
- B. Should any trouble develop during the guarantee time due to defective material, faulty workmanship, or non-compliance with plans, specifications, codes or directions of the Owner, Architect, Engineer or Inspector, the Contractor shall furnish all necessary labor and materials to correct the trouble without additional charges.

1.14 COMMISSIONING

- A. Electrical systems including lighting and lighting controls, occupancy sensors, daylight controls, switching systems, exterior lighting controls and uninterruptible power supplies will be commissioned per the requirements specified in Commissioning Requirements."

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SECTION 26 05 00

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Electrical identification.
 - 2. Utility company electricity-metering components.
 - 3. Concrete equipment bases.
 - 4. Electrical demolition.
 - 5. Cutting and patching for electrical construction.

1.2 SUBMITTALS

- A. Product Data: For utility company electricity-metering components.
- B. Shop Drawings: Dimensioned plans and sections or elevation layouts and single-line diagram of electricity-metering component assemblies specific to this Project.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Devices for Utility Company Electricity Metering: Comply with utility company published standards.
- C. Comply with NFPA 70.

1.4 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings for electrical supports, raceways, and cable with general construction work.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment that requires positioning before closing in the building.
- C. Coordinate electrical service connections to components furnished by utility companies.
 - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for service entrances and electricity-metering components.

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- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces.
- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel: Flange edges turned toward web, and 9/16-inch- diameter slotted holes at a maximum of 2 inches o.c., in webs. Strength rating to suit structural loading.
- D. Slotted Channel Fittings and Accessories: Recommended by the manufacturer for use with the type and size of channel with which used.
 - 1. Materials: Same as channels and angles, except metal items may be stainless steel.
- E. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- F. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- G. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- H. Expansion Anchors: Carbon-steel wedge or sleeve type.
- I. Toggle Bolts: All-steel springhead type.
- J. Powder-Driven Threaded Studs: Heat-treated steel.

2.2 ELECTRICAL IDENTIFICATION

- A. Identification Device Colors: Use those prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick.
- C. Tape Markers for Conductors: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

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- D. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
- E. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape compounded for permanent direct-burial service, and with the following features:
 - 1. Not less than 6 inches wide by 4 mils thick.
 - 2. Embedded continuous metallic strip or core.
 - 3. Printed legend that indicates type of underground line.
- F. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.
- G. Warning and Caution Signs: Preprinted; comply with 29 CFR 1910.145, Chapter XVII. Colors, legend, and size appropriate to each application.
 - 1. Interior Units: Aluminum, baked-enamel-finish, punched or drilled for mechanical fasteners.
 - 2. Exterior Units: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate with 0.0396-inch, galvanized-steel backing. 1/4-inch grommets in corners for mounting.
- H. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.3 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

- A. Comply with requirements of electrical power utility company for all new service entrance equipment, raceways and structures.

2.4 CONCRETE BASES

- A. Concrete Forms and Reinforcement Materials: As specified in Section "Cast-in-Place Concrete."
- B. Concrete: 3000-psi, 28-day compressive strength.

2.5 CONCRETE BOXES

- A. Concrete Boxes: Pre-cast reinforced, size and type as shown; Christy, Brooks or approved equal. All underground boxes shall be provided with traffic grade, spring loaded, bolt-down, steel cover.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom.

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- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, slotted channel system components.
- B. Dry Locations: Steel materials.
- C. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four with, 200-lb minimum design load for each support element.

3.3 SUPPORT INSTALLATION

- A. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- B. Size supports for multiple raceway or cable runs so capacity can be increased by a 25 percent minimum in the future.
- C. Support individual horizontal single raceways with separate, malleable-iron pipe hangers or clamps except use spring-steel fasteners for 1-1/2-inch and smaller single raceways above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- D. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- E. Secure electrical items and their supports to building structure, using the following methods unless other fastening methods are indicated:
 - 1. Wood: Wood screws or screw-type nails.
 - 2. Gypsum Board: Toggle bolts. Seal around sleeves with joint compound, both sides of wall.
 - 3. Masonry: Toggle bolts on hollow block and expansion bolts on solid block. Seal around sleeves with mortar, both sides of wall.
 - 4. New Concrete: Concrete inserts with machine screws and bolts.
 - 5. Existing Concrete: Expansion bolts.
 - 6. Structural Steel: Spring-tension clamps.

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- a. Comply with AWS D1.1 for field welding.
- 7. Light Steel Framing: Sheet metal screws.
- 8. Fasteners for Damp, Wet, or Weather-Exposed Locations: Stainless steel.
- 9. Light Steel: Sheet-metal screws.
- 10. Fasteners: Select so load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- E. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.
- F. Install warning, caution, and instruction signs where required to comply with 29 CFR 1910.145, Chapter XVII, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Indoors install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
- G. Provide service description etched on cover of all underground pull boxes.

3.5 FIRESTOPPING

- A. Apply firestopping to cable and raceway sleeves and other penetrations of fire-rated floor and wall assemblies to restore original undisturbed fire-resistance ratings of assemblies. Firestopping installation is specified in Division 27 Section "Through-Penetration Firestop Systems."

3.6 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's

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anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated.

3.7 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.8 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair, refinish and touch up disturbed finish materials and other surfaces to match adjacent undisturbed surfaces.

END OF SECTION

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SECTION 26 05 19

CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2 SUBMITTALS

- A. Field quality-control test reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 CONDUCTORS AND CABLES

- A. Manufacturers:
 - 1. Alcan Aluminum Corporation; Alcan Cable Div.
 - 2. American Insulated Wire Corp.; a Leviton Company.
 - 3. General Cable Corporation.
 - 4. Senator Wire & Cable Company.
 - 5. Southwire Company.
- B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.
- C. Conductor Material: Copper complying with NEMA WC 5 or 7; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.
- D. Conductor Insulation Types: Type THW, THHN-THWN or XHHW complying with NEMA WC 5 or 7.

2.3 CONNECTORS AND SPLICES

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- A. Manufacturers:
 - 1. AMP Incorporated/Tyco International.
 - 2. Hubbell/Anderson.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M Company; Electrical Products Division.

- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway .
- C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.
- I. Fire Alarm Circuits: Type THHN-THWN, in raceway.
- J. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- K. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.2 INSTALLATION

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

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- D. Install exposed feeders parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26.
- F. Seal around cables penetrating fire-rated elements according to Section "Through-Penetration Firestop Systems."
- G. Identify and color-code conductors and cables according to Division 26 Section "Basic Electrical Materials and Methods."
- H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- I. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.3 FIELD QUALITY CONTROL

- A. Testing: Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

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SECTION 26 05 26

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes grounding of electrical systems and equipment. Requirements specified in this Section may be supplemented by requirements of other Sections.

1.2 SUBMITTALS

- A. Product Data: For ground rods.
- B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled under UL 467 as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Boggs, Inc.
 - 2. Copperweld Corp.
 - 3. Dossert Corp.
 - 4. Erico Inc.; Electrical Products Group.
 - 5. Galvan Industries, Inc.
 - 6. Harger Lightning Protection, Inc.
 - 7. Hastings Fiber Glass Products, Inc.
 - 8. Heary Brothers Lightning Protection Co.
 - 9. ILSCO.
 - 10. Kearney/Cooper Power Systems.
 - 11. Korns, C. C. Co.; Division of Robroy Industries.
 - 12. Lightning Master Corp.
 - 13. Lyncole XIT Grounding.

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14. O-Z/Gedney Co.; a business of the EGS Electrical Group.
15. Robbins Lightning, Inc.
16. Salisbury, W. H. & Co.
17. Superior Grounding Systems, Inc.
18. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Division 16 Section "Conductors and Cables."
- B. Equipment Grounding Conductors: Insulated with green-colored insulation.
- C. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.
- D. Grounding Electrode Conductors: Stranded cable.
- E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.
- F. Bare, Solid-Copper Conductors: ASTM B 3.
- G. Assembly of Bare, Stranded-Copper Conductors: ASTM B 8.
- H. Bare, Tinned-Copper Conductors: ASTM B 33.
- I. Copper Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
- J. Copper Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- K. Tinned-Copper Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- L. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulated spacer.
- M. Connectors: Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items. Exothermic-welded type, in kit form, selected per manufacturer's written instructions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel.
 1. Size: 3/4 inches in diameter by 120 inches long.

PART 3 - EXECUTION

3.1 INSTALLATION

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- A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- B. In raceways, use insulated equipment grounding conductors.
- C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections.
- D. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.
 - 2. At doors, route the bus up to the top of the door frame, across the top of the doorway, and down to the indicated height above the floor.
- E. Underground Grounding Conductors: Use copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade or bury 12 inches above duct bank when installed as part of the duct bank.
- F. Equipment Grounding Conductors: Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
 - 1. Install insulated equipment grounding conductors in feeders.
 - 2. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
 - 3. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.
 - 4. Air-Duct Equipment Circuits: Install an insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners and heaters. Bond conductor to each unit and to air duct.
 - 5. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install an insulated equipment grounding conductor to each electric water heater, heat-tracing, and antifrost heating cable. Bond conductor to heater units, piping, connected equipment, and components.
 - 6. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location and per Division 27.
 - a. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a grounding bus per Division 27.

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- b. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- 7. Metal Poles Supporting Outdoor Lighting Fixtures: Provide a grounding electrode in addition to installing an insulated equipment grounding conductor with supply branch-circuit conductors.
- G. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.
 - 1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
 - 2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except as otherwise indicated. Make connections without exposing steel or damaging copper coating.
- H. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- I. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers or supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.
- J. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
- K. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.
- L. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.
- M. Connections: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

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4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
 6. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
 7. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
 8. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
 9. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
 10. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
 11. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.
- N. Manholes and Handholes: Install a driven ground rod close to wall and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide a No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.
- O. Connections to Manhole Components: Connect exposed-metal parts, such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.

3.2 FIELD QUALITY CONTROL

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- A. Testing: Perform the following field quality-control testing:
1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
 2. Test completed grounding system at each location where a maximum ground-resistance level is indicated and at service disconnect enclosure grounding terminal. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.
 3. Provide drawings locating each ground rod, ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results. Nominal maximum values are as follows:
 - a. Equipment Rated 500 kVA and Less: 10 ohms.
 - b. Equipment Rated 500 to 1000 kVA: 5 ohms.
 - c. Equipment Rated More Than 1000 kVA: 3 ohms.
 - d. Substations and Pad-Mounted Switching Equipment: 5 ohms.
 - e. Manhole Grounds: 10 ohms.

END OF SECTION

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SECTION 26 05 29

SEISMIC CONTROLS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes seismic restraints and other earthquake-damage-reduction measures for electrical components. It applies to and complements optional seismic-restraint requirements in the various electrical component Sections of these Specifications.

1.2 DEFINITIONS

- A. Seismic Restraint: A fixed device (a seismic brace, an anchor bolt or stud, or a fastening assembly) used to prevent vertical or horizontal movement, or both vertical and horizontal movement, of an electrical system component during an earthquake.
- B. Mobile Structural Element: A part of the building structure such as a slab, floor structure, roof structure, or wall that may move independently of other structural elements during an earthquake.

1.3 SUBMITTALS

- A. Product Data: Illustrate and indicate types, styles, materials, strength, fastening provisions, and finish for each type and size of seismic-restraint component used. Include documentation of evaluation and approval of components by agencies acceptable to authorities having jurisdiction.
- B. Shop Drawings: For components, physical arrangements, and installation details not defined by Drawings. Indicate materials, details and layouts.
- C. Pre-approval and Evaluation Documentation: By an agency approved by authorities having jurisdiction, showing maximum ratings of restraints.
- D. Qualification data.
- E. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Comply with seismic-restraint requirements in California Building Code, unless requirements in this Section are more stringent.
- B. Testing Agency Qualifications: An independent testing and inspection agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the inspection indicated.

1.5 PROJECT CONDITIONS

- A. Project Seismic Zone and Zone Factor as Defined in 2016 CBC and per structural documents.

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1.6 COORDINATION

- A. Coordinate layout and installation of seismic bracing with building structure, architectural features, and mechanical, fire-protection, electrical, and other building systems.
- B. Coordinate concrete bases with building structural system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amber/Booth Company, Inc.
 - 2. B-Line Systems, Inc.
 - 3. Erico, Inc.
 - 4. GS Metals Corp.
 - 5. Loos & Company, Inc.
 - 6. Mason Industries, Inc,
 - 7. Powerstrut.
 - 8. Thomas & Betts Corp.
 - 9. Unistrut Corporation.

2.2 MATERIALS

- A. Use the following materials for restraints:
 - 1. Indoor Dry Locations: Steel, zinc plated.
 - 2. Outdoors and Damp Locations: Galvanized steel.
 - 3. Corrosive Locations: Stainless steel.

2.3 ANCHORAGE AND STRUCTURAL ATTACHMENT COMPONENTS

- A. Strength: Defined in reports by ICC Evaluation Service or another agency acceptable to authorities having jurisdiction.
- B. Concrete and Masonry Anchor Bolts and Studs: Steel-expansion wedge type.
- C. Concrete Inserts: Steel-channel type.
- D. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.

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- E. Welding Lugs: Comply with MSS SP-69, Type 57.
- F. Beam Clamps for Steel Beams and Joists: Double sided. Single-sided type is not acceptable.
- G. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings, and matched to the type and size of anchor bolts and studs used.
- H. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to the type and size of attachment devices used.

2.4 SEISMIC-BRACING COMPONENTS

- A. Slotted Steel Channel: 1-5/8-by-1-5/8-inch cross section, formed from 0.1046-inch-thick steel, with 9/16-by-7/8-inch slots at a maximum of 2 inches o.c. in webs, and flange edges turned toward web.
 - 1. Materials for Channel: ASTM A 570, GR 33.
 - 2. Materials for Fittings and Accessories: ASTM A 575, ASTM A 576, or ASTM A 36.
 - 3. Fittings and Accessories: Products of the same manufacturer as channels and designed for use with that product.
 - 4. Finish: Baked, rust-inhibiting, acrylic-enamel paint applied after cleaning and phosphate treatment, unless otherwise indicated.
- B. Channel-Type Bracing Assemblies: Slotted steel channel, with adjustable hinged steel brackets and bolts.
- C. Hanger Rod Stiffeners: Slotted steel channels, installed vertically, with internally bolted connections to hanger rod.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install seismic restraints according to applicable codes and regulations and as approved by authorities having jurisdiction, unless more stringent requirements are indicated.
- B. Install structural attachments as follows:
 - 1. Use bolted connections with steel brackets, slotted channel, and slotted-channel fittings to spread structural loads and reduce stresses.
 - 2. Attachments to New Concrete: Bolt to channel-type concrete inserts or use expansion anchors.
 - 3. Attachments to Existing Concrete: Use expansion anchors.

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4. Holes for Expansion Anchors in Concrete: Drill at locations and to depths that avoid reinforcing bars.
 5. Attachments to Solid Concrete Masonry Unit Walls: Use expansion anchors.
 6. Attachments to Hollow Walls: Bolt to slotted steel channels fastened to wall with expansion anchors.
 7. Attachments to Wood Structural Members: Install bolts through members.
 8. Attachments to Steel: Bolt to clamps on flanges of beams or on upper truss chords of bar joists.
- C. Install electrical equipment anchorage as follows:
1. Anchor panelboards, motor-control centers, motor controls, switchboards, transformers, fused power-circuit devices, control, and distribution units as follows:
 - a. Anchor equipment rigidly to a single mobile structural element or to a concrete base that is structurally tied to a single mobile structural element.
 - b. Size concrete bases so expansion anchors will be a minimum of 10 bolt diameters from the edge of the concrete base.
 - c. Bushings for Floor-Mounted Equipment Anchors: Install to allow for resilient media between anchor bolt or stud and mounting hole in concrete.
 - d. Anchor Bolt Bushing Assemblies for Wall-Mounted Equipment: Install to allow for resilient media where equipment or equipment-mounting channels are attached to wall.
 - e. Torque bolts and nuts on studs to values recommended by equipment manufacturer.
- D. Install seismic bracing as follows:
1. Install bracing according to spacings and strengths indicated by approved analysis.
 2. Expansion and Contraction: Install to allow for thermal movement of braced components.
 3. Attachment to Structure: If specific attachment is not indicated, anchor bracing to the structure at flanges of beams, upper truss chords of bar joists, or at concrete members.
- E. Accommodation of Differential Seismic Motion: Make flexible connections in raceways, cables, wireway, cable trays, and busway where they cross expansion- and seismic-control joints, where adjacent sections or branches are supported by different structural elements, and where they terminate at electrical equipment anchored to a different mobile structural element from the one supporting them.

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3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspection agency to inspect seismic-control installation for compliance with indicated requirements.
- B. Testing Agency: Engage a qualified testing and inspection agency to inspect seismic-control installation for compliance with indicated requirements.
- C. Reinspection: Correct deficiencies and verify by reinspection that work complies with requirements.
- D. Provide written report of tests and inspections.

END OF SECTION

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SECTION 26 13 00

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets indicated.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 METAL CONDUIT AND TUBING

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 4. Electri-Flex Co.
 - 5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
 - 6. LTV Steel Tubular Products Company.
 - 7. Manhattan/CDT/Cole-Flex.
 - 8. O-Z Gedney; Unit of General Signal.
 - 9. Wheatland Tube Co.
- B. Rigid Steel Conduit: ANSI C80.1.

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- C. Aluminum Rigid Conduit: ANSI C80.5.
- D. IMC: ANSI C80.6.
- E. EMT and Fittings: ANSI C80.3.
 - 1. Fittings: Compression type.
- F. FMC: Aluminum.
- G. LFMC: Flexible steel conduit with PVC jacket.
- H. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers:
 - 1. American International.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Arnco Corp.
 - 4. Cantex Inc.
 - 5. Certainteed Corp.; Pipe & Plastics Group.
 - 6. Condux International.
 - 7. ElecSYS, Inc.
 - 8. Electri-Flex Co.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT/Cole-Flex.
 - 11. RACO; Division of Hubbell, Inc.
 - 12. Spiralduct, Inc./AFC Cable Systems, Inc.
 - 13. Thomas & Betts Corporation.
- B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.
- C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.4 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.
 - 1. Manufacturers:
 - a. Airey-Thompson Sentinel Lighting; Wiremold Company (The).
 - b. Thomas & Betts Corporation.
 - c. Walker Systems, Inc.; Wiremold Company (The).
 - d. Wiremold Company (The); Electrical Sales Division.

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- B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard color.
1. Manufacturers:
 - a. Butler Manufacturing Co.; Walker Division.
 - b. Enduro Composite Systems.
 - c. Hubbell, Inc.; Wiring Device Division.
 - d. Lamson & Sessions; Carlon Electrical Products.
 - e. Panduit Corp.
 - f. Walker Systems, Inc.; Wiremold Company (The).
 - g. Wiremold Company (The); Electrical Sales Division.
- C. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers:
1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 2. Emerson/General Signal; Appleton Electric Company.
 3. Erickson Electrical Equipment Co.
 4. Hoffman.
 5. Hubbell, Inc.; Killark Electric Manufacturing Co.
 6. O-Z/Gedney; Unit of General Signal.
 7. RACO; Division of Hubbell, Inc.
 8. Robroy Industries, Inc.; Enclosure Division.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- H. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match

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panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

- I. Concrete Boxes: Pre-cast reinforced, size and type as shown; Christy, Brooks or approved equal. All underground boxes shall be provided with traffic grade, spring loaded, bolt-down, steel cover.

2.6 FACTORY FINISHES

- A. Finish: For raceway, enclosure, or cabinet components provide manufacturer's standard prime-coat finish ready for field painting.

B.

C.

2.7 FIRESTOPPING FOR LOW VOLTAGE SLEEVES

- A. Firestop Pillows: STI SpecSeal® Brand re-enterable, non-curing, mineral fiber core encapsulated on six sides with intumescent coating contained in a flame retardant poly bag, the following products are acceptable:

1. Specified Technologies Inc. (STI) SpecSeal® Series SSB Pillows.

- B. Fire Rated Cable Pathways: STI EZ-PATH™ Brand device modules comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill, the following products are acceptable:

1. Specified Technologies Inc. (STI) EZ-PATH™ Fire Rated Pathway.

2. Specified Technologies Inc. (STI) Mini EZ-PATH™ Fire Rated Pathway.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors:

1. Exposed: Rigid steel or IMC.

2. Concealed: Rigid steel or IMC.

3. Underground, Single Run: RNC.

4. Underground, Grouped: RNC.

5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

6. Boxes and Enclosures: NEMA 250, Type 3R.

- B. Indoors:

1. Exposed: EMT.

2. Concealed: EMT.

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3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
 4. Damp or Wet Locations: Rigid steel conduit.
 5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.
 3. For Outdoor Use – conduit hub, NEMA 4 for conduit connection/terminating to cabinet/panel/boxes.
 4. All connectors to be steel. Die cast connectors are not acceptable.
- E. Do not install aluminum conduits embedded in or in contact with concrete.

3.2 INSTALLATION

- A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- B. Complete raceway installation before starting conductor installation.
- C. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."
- D. Install temporary closures to prevent foreign matter from entering raceways.
- E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above finished slab.
- F. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
 1. Install concealed raceways with a minimum of bends in shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.
 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.

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2. Space raceways laterally to prevent voids in concrete.
 3. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 4. Change from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.
- I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
1. Run parallel or banked raceways together on common supports.
 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- J. Join raceways with fittings designed and approved for that purpose and make joints tight.
1. Use insulating bushings to protect conductors on all raceways 2" and larger.
- K. Tighten set screws of threadless fittings with suitable tools.
- L. Terminations:
1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- N. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- O. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- P. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for

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plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

- Q. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.
- R. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.
- S. Set floor boxes level and flush with finished floor surface.
- T. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.3 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

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SECTION 26 22 00

FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cartridge fuses rated 600 V and less for use in switches controllers and motor-control centers.

1.2 SUBMITTALS

- A. Product Data: For each fuse type indicated.
- B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA FU 1.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper Bussman, Inc.
 2. Eagle Electric Mfg. Co., Inc.; Cooper Industries, Inc.
 3. Ferraz Shawmut, Inc.
 4. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

- A. Service Entrance: Class L, fast acting or J, fast acting.
- B. Motor Branch Circuits: Class RK5, time delay.

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3.2 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.3 IDENTIFICATION

- A. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION

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SECTION 26 24 20

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Bus configuration, current, and voltage ratings.
 - c. Short-circuit current rating of panelboards and overcurrent protective devices.
 - d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
 - 3. Field quality-control test reports.
 - 4. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
 - a. Eaton Corporation; Cutler-Hammer Products.
 - b. General Electric Co.; Electrical Distribution & Protection Div.
 - c. Siemens Energy & Automation, Inc.
 - d. Square D.

2.2 MANUFACTURED UNITS

- A. Enclosures: Flush- and surface-mounted cabinets. NEMA PB 1, Type 1.
 1. Rated for environmental conditions at installed location.
 - a. Outdoor Locations: NEMA 250, Type 3R.
 - b. Kitchen Areas: NEMA 250, Type 4.
 - c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
- B. Phase and Ground Buses: Hard-drawn copper, 98 percent conductivity.
- C. Conductor Connectors: Suitable for use with conductor material.
 1. Ground Lugs and Bus Configured Terminators: Compression type.
- D. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.
- E. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices. Provide 20% space in all panelboards
- F. Panelboard Short-Circuit Rating:
 1. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.3 DISTRIBUTION PANELBOARDS

- A. Doors: Secured with vault-type latch with tumbler lock; keyed alike. Omit for fused-switch panelboards.
- B. Main Overcurrent Protective Devices: Circuit breaker.
- C. Branch Overcurrent Protective Devices:
 1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

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2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units. No tie-handle allowed for multi-pole breakers.
- B. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: UL 489, with interrupting capacity to meet available fault currents.
 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. GFCI Circuit Breakers: Single- and two-pole configurations with 30-mA trip sensitivity.
 3. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.
 - a. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - b. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
 - c. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

2.6 ACCESSORY COMPONENTS AND FEATURES

- A. Furnish accessory set including tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Fungus Proofing: Permanent fungicidal treatment for panelboard interior, including overcurrent protective devices and other components for all NEMA 3R panelboards.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."
- C. Mount top of trim 74 inches above finished floor, unless otherwise indicated.

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- D. Mount plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- E. Install overcurrent protective devices and controllers.
 - 1. Set field-adjustable switches and circuit-breaker trip ranges.
- F. Install filler plates in unused spaces.
- G. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future.
- H. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Basic Electrical Materials and Methods."
- I. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.
- J. Ground equipment according to Division 26 Section "Grounding and Bonding."
- K. Connect wiring according to Division 26 Section "Conductors and Cables."

3.2 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION

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SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Single and duplex receptacles, ground-fault circuit interrupters.
 - 2. Single- and double-pole snap switches and dimmer switches.
 - 3. Device wall plates.
 - 4. Floor service outlets, poke-through assemblies and multioutlet assemblies.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wiring Devices:
 - a. Bryant Electric, Inc./Hubbell Subsidiary.
 - b. Eagle Electric Manufacturing Co., Inc.
 - c. Hubbell Incorporated; Wiring Device-Kellems.
 - d. Leviton Mfg. Company Inc.
 - e. Pass & Seymour/Legrand; Wiring Devices Div.
 - 2. Multioutlet Assemblies:

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- a. Hubbell Incorporated; Wiring Device-Kellems.
- b. Wiremold Company (The).
3. Poke-Through, Floor Service Outlets and Telephone/Power Poles:
 - a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. Pass & Seymour/Legrand; Wiring Devices Div.
 - c. Square D/Groupe Schneider NA.
 - d. Thomas & Betts Corporation.
 - e. Wiremold Company (The).

2.2 RECEPTACLES

- A. Straight-Blade and Locking Receptacles: Heavy-Duty grade.
- B. Straight-Blade Receptacles: Hospital grade.
- C. GFCI Receptacles: Straight blade, non-feed-through type, Hospital or Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch deep outlet box without an adapter.

2.3 SWITCHES

- A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.
- B. Snap Switches: Heavy-Duty grade, quiet type.
- C. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.
 1. Switch: 20 A, 120/277-V ac.
 2. Receptacle: NEMA WD 6, Configuration 5-20R.
- D. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.
 1. Control: Continuously adjustable slider; with single-pole or three-way switching to suit connections.
 2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable rotary knob, toggle switch, or slider; single pole with soft tap or other quiet switch; EMI/RFI filter to eliminate interference; and 5-inch wire connecting leads.
 3. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

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2.4 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces:
 - a. 0.035-inch thick, satin-finished stainless steel.
 - 3. Material for Unfinished Spaces: Galvanized steel.
 - 4. Material for Wet Locations: Cast aluminum with spring-loaded, lockable, lift cover, and listed and labeled for use in "wet locations."

2.5 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular, solid brass with satin finish.
- D. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.
- E. Voice and Data Communication Outlet: See telecommunication specifications for requirements.
- F. Wiremold RFB4-4DB series complete with brackets, devices, corresponding covers and hardware.

2.6 POKE-THROUGH ASSEMBLIES

- A. Description: Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.
 - 1. Service Outlet Assembly: Flush type with two simplex receptacles and space for two RJ-45 jacks.
 - 2. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.
 - 3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
 - 4. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.
 - 5. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors; and a minimum of four, 4-pair, Category 6 voice and data communication cables.

2.7 MULTIOUTLET ASSEMBLIES

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A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

B. Raceway Material: PVC.

C. Wire: No. 12 AWG.

2.8 FINISHES

A. Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Install wall dimmers to achieve indicated rating after derating for ganging.

C. Install unshared neutral conductors on line and load side of dimmers.

D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.

E. Remove wall plates and protect devices and assemblies during painting.

F. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Basic Electrical Materials and Methods."

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

2. Submit same for approval.

3.3 CONNECTIONS

A. Ground equipment according to Division 26 Section "Grounding and Bonding."

B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections:

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.

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2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION

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SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following individually mounted, enclosed switches and circuit breakers:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Molded-case circuit breakers.
 - 4. Enclosures.

1.2 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

- A. Manufacturers:
 - 1. Eaton Corporation; Cutler-Hammer Products.
 - 2. General Electric Co.; Electrical Distribution & Control Division.
 - 3. Siemens Energy & Automation, Inc.

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4. Square D/Group Schneider.
- B. Fusible Switch, 600 A and Smaller: NEMA KS 1, Type GD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- C. Nonfusible Switch, 600 A and Smaller: NEMA KS 1, Type GD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- D. Accessories:
 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper and aluminum neutral conductors.
 3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open (required for all disconnects located downstream of Variable frequency Drives)

2.3 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

- A. Manufacturers:
 1. Eaton Corporation; Cutler-Hammer Products.
 2. General Electric Co.; Electrical Distribution & Control Division.
 3. Siemens Energy & Automation, Inc.
 4. Square D/Group Schneider.
- B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.
 4. GFCI Circuit Breakers: Single- and two-pole configurations with 30-mA trip sensitivity.
- C. Molded-Case Circuit-Breaker Features and Accessories:
 1. Standard frame sizes, trip ratings, and number of poles.
 2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.

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3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
4. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

2.4 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
 1. Outdoor Locations: NEMA 250, Type 3R.
 2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
 3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.
- B. Concrete base is specified in Division 26 Section "Basic Electrical Materials and Methods," and concrete materials and installation requirements are specified in Division 3.
- C. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.
- D. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.
- E. Comply with mounting and anchoring requirements specified in Division 26 Section "Seismic Controls for Electrical Work."
- F. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- G. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Basic Electrical Materials and Methods."

3.2 FIELD QUALITY CONTROL

- A. Prepare for acceptance testing as follows:
 1. Inspect mechanical and electrical connections.
 2. Verify switch and relay type and labeling verification.
 3. Verify rating of installed fuses.
- B. Perform the following field tests and inspections and prepare test reports:

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1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION

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SECTION 26 51 00

INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior lighting fixtures with lamps and ballasts.
2. Lighting fixtures mounted on exterior building surfaces.
3. Emergency lighting units.
4. Exit signs.
5. Accessories, including fluorescent fixture dimmers, occupancy sensors and lighting fixture retrofitting.

1.2 SUBMITTALS

- A. Product Data: For each type of lighting fixture scheduled, arranged in order of fixture designation. Include data on features, accessories, and finishes. Clearly identify ballast(s) and lamp(s) for each lighting fixture.
- B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.
- C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 FIXTURES AND COMPONENTS, GENERAL

- A. Air-Handling Fluorescent Fixtures: For use with plenum ceiling for air return and heat extraction and for attaching an air-diffuser-boot assembly specified in Division 15 Section "Diffusers, Registers, and Grilles."

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1. Air Supply Units: Slots in one or both side trims join with air-diffuser-boot assemblies.
2. Heat Removal Units: Air path leads through lamp cavity.
3. Combination Heat Removal and Air Supply Unit: Heat is removed through lamp cavity at both ends of the fixture door with air supply same as for air supply units.
4. Dampers: Operable from outside fixture for control of return-air volume.
5. Static Fixtures: Air supply slots are blanked off, and fixture appearance matches active units.

2.3 LIGHTING FIXTURES

- A. Fixture : See drawings.

2.4 LAMP BALLASTS

- A. Description: Include the following features, unless otherwise indicated:

1. Designed for type and quantity of lamps indicated at full light output except for emergency lamps powered by in-fixture battery-packs.
2. Externally fused with slow-blow type rated between 2.65 and 3.0 times the line current.
3. Warranted for 5 years to include replacement ballasts and labor cost, plus lamp warranty for at least 2 years for lamps used with ballast.

- B. LED lamps shall include following features:

1. L.E.D. 3000K/3500K - Philips, CREE or approved equal..
2. Comply with NEMA C82.11.
3. Normal Light Output (NLO) BF 0.87.
4. Sound Rating: A.
5. Total harmonic distortion rating of less than 20 percent according to NEMA C82.11.
6. Transient Voltage Protection: IEEE C62.41, Category A.
7. Listed class P automatic reset thermal protection.
8. Lamp Current Crest Factor: Less than 1.7

- C. Ballasts for dimmer-controlled fixtures shall comply with general and fixture-related requirements above for electronic ballasts and the following features:

1. Dimming Range: 100 to 5 percent of rated lamp lumens.
2. Ballast Input Watts: Can be reduced to 20 percent of normal.

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3. Compatibility: Certified by manufacturer for use with specific dimming system indicated.

2.5 EXIT SIGNS

- A. General: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum of rated lamp life.
- C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

2.6 EMERGENCY LIGHTING UNITS

- A. General: Self-contained units complying with UL 924.
 1. Battery: Sealed, maintenance-free, lead-acid type with minimum 10-year nominal life and special warranty.
 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 3. Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 4. Wire Guard: Where indicated, heavy-chrome-plated wire guard protects lamp heads or fixtures.
 5. Integral Time-Delay Relay: Holds unit on for fixed interval when power is restored after an outage; time delay permits high-intensity-discharge lamps to restrike and develop adequate output.

2.7 EMERGENCY LIGHTING FIXTURES

- A. Internal Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.
 1. Emergency Connection: Operate one lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.

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2. Night Light Connection: Operate one lamp continuously.
3. Test Switch and Light-Emitting-Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
4. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum seven-year nominal life.
5. Charger: Fully automatic, solid-state, constant-current type.

2.8 LED LAMPS

- A. L.E.D. 3000K/3500K - Philips, CREE or approved equal..

2.9 FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 16 Section "Basic Electrical Materials and Methods" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch.
- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated, 12 gage.
- E. Wires For Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
- F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

2.10 LIGHTING CONTROL DEVICES

- A. Dimming Ballast Controls: Sliding-handle type with on/off control; compatible with ballast and having light output and energy input over the full dimming range.
- B. Light Level Sensor: Detect changes in ambient lighting level and provide dimming range of 20 to 100 percent in response to change.
 1. Sensor Capacity: At least 40 electronic dimming ballasts.
 2. Adjustable Ambient Detection Range: 10 to 100 fc minimum
- C. Occupancy Sensors: Adjustable sensitivity and off delay time range of 5 to 15 minutes.
 1. Device Color:
 - a. Wall Mounted: White.
 - b. Ceiling Mounted: White.
 2. Occupancy detection indicator.

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3. Ultrasonic Sensors: Crystal controlled with circuitry that causes no detection interference between adjacent sensors.
4. Infrared Sensors: With daylight filter and lens to afford coverage applicable to space to be controlled.
5. Combination Sensors: Ultrasonic and infrared sensors combined.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.
 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.
 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
 4. Install at least two independent support rods or wires from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- C. Suspended Fixture Support: As follows:
 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging. Pendant fixtures shall be free to swing a minimum of 45 degrees from the vertical in all directions without contacting any obstructions. Otherwise, seismic restraints are required.
 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
 4. Continuous Rows: Suspend from cable.
- D. Air-Handling Fixtures: Install with dampers closed and ready for adjustment.
- E. Adjust aimable fixtures to provide required light intensities.
- F. Occupancy sensor and daylighting sensor placement review by factory representative is required before installing sensors.

3.2 COMMISSIONING

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- A. All electrical power and lighting controls will be commissioned per the requirements of Section 01810, Commissioning Requirements. Contractor is to provide a factory representative to start-up, test and commission all lighting controls.

END OF SECTION

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SECTION 26 51 01

LIGHTING CONTROL SYSTEM

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Digital Lighting Controls
2. Relay Panels
3. Emergency Lighting Control (if applicable)

B. Related Sections:

1. Section 26 27 26 - Wiring Devices
2. Section 26 51 00 – Interior Lighting
3. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section
4. Electrical Sections, including wiring devices, apply to the work of this Section.

C. Control Intent – Control Intent includes, but is not limited to:

1. Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.
2. Initial sensor and switching zones
3. Initial time switch settings
4. Task lighting and receptacle controls
5. Emergency Lighting control (if applicable)

1.2 REFERENCES

- A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)
- B. International Electrotechnical Commission (IEC)
- C. International Organization for Standardization (ISO)

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- D. National Electrical Manufacturers Association (NEMA)
- E. WD1 (R2005) - General Color Requirements for Wiring Devices.
- F. Underwriters Laboratories, Inc. (UL)
 - 1. 20 – Plug Load Controls
 - 2. 508– Industrial Controls
 - 3. 916 – Energy Management Equipment.
 - 4. 924 – Emergency Lighting

1.3 SYSTEM DESCRIPTION & OPERATION

- A. The Lighting Control and Automation system as defined under this section covers the following equipment:
 - 1. Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
 - 2. Digital Switches – Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications.
 - 3. Handheld remotes for personal control – One-button dimming, two-button on/off, or five-button scene remotes provide control using infrared communications. Remote may be configured in the field to control selected loads or scenes without special tools.
 - 4. Digital Daylighting Sensors – Single-zone closed loop, multi-zone open loop and single-zone dual-loop daylighting sensors with two-way active infrared (IR) communications can provide switching, bi-level, tri-level or dimming control for daylight harvesting.
 - 5. Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.
 - 6. Digital Plug-Load Controllers – Not applicable to this project.
 - 7. Configuration Tools – Handheld remote for room configuration and relay panel programming provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow bi-directional communication of room variables and occupancy sensor settings. Computer software also customizes room settings.

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8. Digital Lighting Management (DLM) local network – Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.
9. Digital Lighting Management (DLM) segment network – Linear topology, BACnet MS/TP network (1.5 twisted pair, shielded,) to connect multiple DLM local networks for centralized control.
10. Network Bridge – provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS) and automatically creates BACnet objects representative of connected devices.
11. Segment Manager – provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.
12. Programming and Configuration software – Optional PC-native application capable of accessing DLM control parameters within a room, for the local network, via a USB adapter, or globally, for many segment networks simultaneously, via BACnet/IP communication.
13. LMCP Digital Lighting Management Relay Panel – provides up to 8, 24, or 48 mechanically latching relays. Relays include a manual override and a single push-on connector for easy installation or removal from the panel. Panel accepts program changes from handheld configuration tool for date and time, location, holidays, event scheduling, button binding and group programming. Provides BACnet MS/TP-compliant digital networked communication between other lighting controls and/or building automation system (BAS).
14. Emergency Lighting Control Unit (ELCU) – allows a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building

1.4 LIGHTING CONTROL APPLICATIONS

- A. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:
 1. Space Control Requirements – Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality in all spaces except toilet rooms, storerooms, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, open plan system and training room. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.
 2. Bi-Level Lighting – Provide multi-level controls in all spaces except toilet rooms, storerooms, or applications where variable dimming is used.

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3. Task Lighting / Plug Loads – Not applicable to this project.
4. Daylit Areas – Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by relevant local building energy code:
 - a. All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones.
 - b. Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes.
 - c. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.
 - d. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.
5. Conference, meeting, training, auditoriums, and multipurpose rooms shall have controls that allow for independent control of each local control zone. Rooms larger than 300 square feet shall instead have at least four (4) pre-set lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to extinguish all lighting in the space. Spaces with up to four moveable walls shall include controls that can be reconfigured when the room is partitioned.

1.5 SUBMITTALS

- A. Submittals Package: Submit the shop drawings, and the product data specified below at the same time as a package.
- B. Shop Drawings:
 1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
 2. Show exact location of all digital devices, including at minimum sensors, room controllers, and switches for each area on reflected ceiling plans. (Contractor must provide AutoCAD format reflected ceiling plans.)

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3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.
4. Network riser diagram including floor and building level details. Include network cable specification and end-of-line termination details, if required. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.

C. Product Data: Catalog sheets, specifications and installation instructions.

D. Include data for each device which:

1. Indicates where sensor is proposed to be installed.
2. Prove that the sensor is suitable for the proposed application.

1.6 QUALITY ASSURANCE

A. Manufacturer: Minimum [10] years experience in manufacture of lighting controls.

1.7 PROJECT CONDITIONS

A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:

1. Ambient temperature: 0° to 40° C (32° to 104° F).
2. Relative humidity: Maximum 90 percent, non-condensing.

1.8 WARRANTY

A. Provide a five year limited manufacturer's warranty on all room control devices and panels.

1.9 MAINTENANCE

A. Spare Parts:

1. Provide 10% spares of each product to be used for maintenance for wall switches, dimmer switches and controllers.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

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A. Acceptable Manufacturer:

1. WattStopper
 - a. System: Digital Lighting Management (DLM)
2. Basis of design product: WattStopper Digital Lighting Management (DLM).

B. Substitutions: [If Permitted]

1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 10 working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.
2. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring. The contractor shall provide complete engineered shop drawings (including power and control wiring) with deviations from the original design highlighted for review and approval prior to rough-in.

2.2 DIGITAL LIGHTING CONTROLS

- A. Furnish the Company's system which accommodates the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories which suit the lighting and electrical system parameters.

2.3 DIGITAL WALL SWITCH OCCUPANCY SENSORS

- A. Wallbox mounted passive infrared PIR or dual technology (passive infrared and ultrasonic) digital occupancy sensor with 1 or 2 switch buttons.
- B. Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:
1. Digital calibration and pushbutton configuration for the following variables:
 - a. Sensitivity – 0-100% in 10% increments
 - b. Time delay – 1-30 minutes in 1 minute increments
 - c. Test mode – Five second time delay
 - d. Detection technology – PIR, Dual Technology activation and/or re-activation.
 - e. Walk-through mode

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- f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.
2. Programmable control functionality including:
 - a. Each sensor may be programmed to control specific loads within a local network.
 - b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
 - c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically during the configurable period of time (default 10 seconds) after turning off.
 - d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
 - a) Ultrasonic and Passive Infrared
 - b) Ultrasonic or Passive Infrared
 - c) Ultrasonic only
 - d) Passive Infrared only
3. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
4. Two RJ-45 ports for connection to DLM local network.
5. Two-way infrared (IR) transceiver to allow remote programming through handheld configuration tool and control by remote personal controls.
6. Device Status LEDs including:
 - a. PIR detection
 - b. Ultrasonic detection
 - c. Configuration mode
 - d. Load binding
7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
8. Assignment of local buttons to specific loads within the room without wiring or special tools
9. Manual override of controlled loads.

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10. All digital parameter data programmed into an individual wall switch sensor shall be retained in non-volatile FLASH memory within the wall switch sensor itself. Memory shall have an expected life of no less than 10 years.
- C. BACnet object information shall be available for the following objects:
1. Detection state
 2. Occupancy sensor time delay
 3. Occupancy sensor sensitivity, PIR and Ultrasonic
 4. Button state
 5. Switch lock control
 6. Switch lock status
- D. Units shall not have any dip switches or potentiometers for field settings.
- E. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.
- F. Two-button wall switch occupancy sensors, when connected to a single relay dimming room controller, shall operate in the following sequence as a factory default:
1. Left button
 - a. Press and release - Turn load on
 - b. Press and hold - Raise dimming load
 2. Right button
 - a. Press and release - Turn load off
 - b. Press and hold - Lower dimming load
- G. Low voltage momentary pushbuttons shall include the following features:
1. Load/Scene Status LED on each switch button with the following characteristics:
 - a. Bi-level LED
 - b. Dim locator level indicates power to switch
 - c. Bright status level indicates that load or scene is active
 2. The following button attributes may be changed or selected using a wireless configuration tool:
 - a. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).

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- b. Individual button function may be configured to Toggle, On only or Off only.
 - c. Individual scenes may be locked to prevent unauthorized change.
 - d. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
 - e. Ramp rate may be adjusted for each dimmer switch.
 - f. Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.
- H. WattStopper part numbers: LMPW, LMDW. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

2.4 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR

- A. Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor.
- B. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:
 - 1. Digital calibration and pushbutton configuration for the following variables:
 - a. Sensitivity – 0-100% in 10% increments
 - b. Time delay – 1-30 minutes in 1 minute increments
 - c. Test mode – Five second time delay
 - d. Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
 - e. Walk-through mode
 - f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.
 - 2. Programmable control functionality including:
 - a. Each sensor may be programmed to control specific loads within a local network.
 - b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
 - c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.

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- d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
 - i Ultrasonic and Passive Infrared
 - ii Ultrasonic or Passive Infrared
 - iii Ultrasonic only
 - iv Passive Infrared only
- 3. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
- 4. One or two RJ-45 port(s) for connection to DLM local network.
- 5. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.
- 6. Device Status LEDs, which may be disabled for selected applications, including:
 - a. PIR detection
 - b. Ultrasonic detection
 - c. Configuration mode
 - d. Load binding
- 7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
- 8. Manual override of controlled loads.
- 9. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
- B. BACnet object information shall be available for the following objects:
 - 1. Detection state
 - 2. Occupancy sensor time delay
 - 3. Occupancy sensor sensitivity, PIR and Ultrasonic
- C. Units shall not have any dip switches or potentiometers for field settings.
- D. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.
- E. WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

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2.5 DIGITAL WALL SWITCHES

- A. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration. Wall switches shall include the following features:
 - 1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
 - 2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
 - 3. Configuration LED on each switch that blinks to indicate data transmission.
 - 4. Load/Scene Status LED on each switch button with the following characteristics:
 - a. Bi-level LED
 - b. Dim locator level indicates power to switch
 - c. Bright status level indicates that load or scene is active
 - 5. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.
 - 6. Programmable control functionality including:
 - a. Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority
 - b. Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.
 - 7. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.
- B. BACnet object information shall be available for the following objects:
 - 1. Button state
 - 2. Switch lock control
 - 3. Switch lock status
- C. Two RJ-45 ports for connection to DLM local network.
- D. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.
- E. The following switch attributes may be changed or selected using a wireless configuration tool:

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1. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
 2. Individual button function may be configured to Toggle, On only or Off only.
 3. Individual scenes may be locked to prevent unauthorized change.
 4. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
 5. Ramp rate may be adjusted for each dimmer switch.
 6. Switch buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.
- F. WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

2.6 HANDHELD REMOTE CONTROLS

- A. Battery-operated handheld devices in 1, 2 and 5 button configurations for remote switching or dimming control. Remote controls shall include the following features:
1. Two-way infrared (IR) transceiver for line of sight communication with DLM local network within up to 30 feet.
 2. LED on each button confirms button press.
 3. Load buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.
 4. Inactivity timeout to save battery life.
- B. A wall mount holster and mounting hardware shall be included with each remote control
- C. WattStopper part numbers: LMRH-101, LMRH-102, LMRH-105.

2.7 DIGITAL PARTITION CONTROLS

- A. Partition controls shall enable manual or automatic coordination of lighting controls in flexible spaces with up to four moveable walls by reconfiguring the connected digital switches and occupancy sensors.
- B. Four-button low voltage pushbutton switch for manual control.
1. Two-way infrared (IR) transceiver for use with configuration remote control.

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2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
 3. Configuration LED on each switch that blinks to indicate data transmission.
 4. Each button represents one wall; Green button LED indicates status.
 5. Two RJ-45 ports for connection to DLM local network.
 6. WattStopper part number: LMPS-104. Available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening.
- c. Contact closure interface for automatic control via input from limit switches on movable walls (by others).
1. Operates on Class 2 power supplied by DLM local network.
 2. Includes 24VDC output and four input terminals for maintained third party contract closure inputs.
 - a. Input max. sink/source current: 1-5mA
 - b. Logic input signal voltage High: >18VDC
 - c. Logic input signal voltage Low: <2VDC
 3. Four status LEDs under hinged cover indicate if walls are open or closed; supports LMPS-104 as remote status indicator.
 4. Two RJ-45 ports for connection to DLM local network.
 5. WattStopper part number: LMIO-102

2.8 DIGITAL DAYLIGHTING SENSORS

- A. Digital daylighting sensors shall work with room controllers to provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to a room controller. Daylighting sensors shall be interchangeable without the need for rewiring.
1. Closed loop sensors measure the ambient light in the space and control a single lighting zone.
 2. Open loop sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones.
 3. Dual loop sensors measure both ambient and incoming daylight in the space to insure that proper light levels are maintained as changes to reflective materials are made in a single zone.
- B. Digital daylighting sensors shall include the following features:

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1. The sensor's internal photodiode shall only measure lightwaves within the visible spectrum. The photodiode's spectral response curve shall closely match the entire photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers.
2. Sensor light level range shall be from 1-6,553 footcandles (fc).
3. The capability of ON/OFF, bi-level or tri-level switching, or dimming, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).
4. For switching daylight harvesting, the photosensor shall provide a field-selectable deadband, or a separation, between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling excessively after they turn off.
5. For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level.
6. Photosensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second.
7. Photosensors shall provide adjustable cut-off time. Cut-off time is defined by the number of selected minutes the load is at the minimum output before the load turns off. Selectable range between 0-240 minutes including option to never cut-off.
8. Optional wall switch override shall allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise lighting levels for a selectable period of time or cycle of occupancy.
9. Integral infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.
10. Configuration LED status light on device that blinks to indicate data transmission.
11. Status LED indicates test mode, override mode and load binding.
12. Recessed switch on device to turn controlled load(s) ON and OFF.
13. BACnet object information shall be available for the following daylighting sensor objects, based on the specific photocell's settings:
 - a. Light level
 - b. Day and night setpoints
 - c. Off time delay
 - d. On and off setpoints
 - e. Up to three zone setpoints
 - f. Operating mode – on/off, bi-level, tri-level or dimming

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14. One RJ-45 port for connection to DLM local network.
 15. A choice of accessories to accommodate multiple mounting methods and building materials. The photosensors may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox. Standard tube photosensors accommodate mounting materials from 0-0.62" thickness (LMLS-400, LMLS-500). Extended tube photosensors accommodate mounting materials from 0.62"-1.25" thickness (LMLS-400-L, LMLS-500-L). Mounting brackets are compatible with J boxes (LMLS-MB1) and wall mounting (LMLS-MB2). LMLS-600 photosensor to be mounted on included bracket below skylight well.
 16. Any load or group of loads in the room can be assigned to a daylighting zone
 17. Each load within a daylighting zone can be individually enabled or disabled for discrete control (load independence).
 18. All digital parameter data programmed into a photosensor shall be retained in non-volatile FLASH memory within the photosensor itself. Memory shall have an expected life of no less than 10 years.
- c. Closed loop digital photosensors shall include the following additional features:
1. An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.
 2. Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.
 3. Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads.
 4. WattStopper Product Number: LMLS-400, LMLS-400-L.
- d. Open loop digital photosensors shall include the following additional features:
1. An internal photodiode that measures light in a 60-degree angle cutting off the unwanted light from the interior of the room.
 2. Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone.
 3. Each of the three discrete daylight zones can include any non overlapping group of loads in the room.

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4. WattStopper Product Number: LMLS-500, LMLS-500-L.
- E. Dual loop digital photosensors shall include the following additional features:
1. Close loop portion of dual loop device must have an internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from sources outside of this con
 2. Open loop portion of dual loop device must have an internal photodiode that can measure light in a 60 degree angle, cutting off the unwanted light from the interior of the room.
 3. Automatically establishes application-specific set-points following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of load.
 4. Device must reference closed loop photosensor information as a base line reference. The device must be able to analyze the open loop photosensor information to determine if an adjustment in light levels is required.
 5. Device must be able to automatically commission setpoints each night to provide adjustments to electrical lighting based on changes in overall lighting in the space due to changes in reflectance within the space or changes to day-light contribution based on seasonal changes.
 6. Device must include extendable mounting arm to properly position sensor within a skylight well.
 7. WattStopper product number LMLS-600

2.9 DIGITAL ROOM CONTROLLERS AND PLUG-LOAD CONTROLLERS

- A. Digital controllers for lighting and plug loads automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements. The controllers will be simple to install, and will not have dip switches or potentiometers, or require special configuration for standard Plug n' Go applications. The control units will include the following features:
1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
 2. Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf.
 3. Multiple room controllers connected together in a local network must automatically prioritize each room controller, without requiring any configuration or setup, so that loads are sequentially assigned using room controller device ID's from highest to lowest.
 4. Device Status LEDs to indicate:

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- a. Data transmission
 - b. Device has power
 - c. Status for each load
 - d. Configuration status
5. Quick installation features including:
- a. Standard junction box mounting
 - b. Quick low voltage connections using standard RJ-45 patch cable
6. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:
- a. Turn on to 100%
 - b. Remain off
 - c. Turn on to last level
7. Each load shall be configurable to operate in the following sequences based on occupancy:
- a. Auto-on/Auto-off (Follow on and off)
 - b. Manual-on/Auto-off (Follow off only)
8. The polarity of each load output shall be reversible, via digital configuration, so that on is off and off is on.
9. BACnet object information shall be available for the following objects:
- a. Load status
 - b. Electrical current
 - c. Total watts per controller
 - d. Schedule state – normal or after-hours
 - e. Demand response control and cap level
 - f. Room occupancy status
 - g. Total room lighting and plug loads watts
 - h. Total room watts/sq ft
 - i. Force on/off all loads
10. UL 2043 plenum rated
11. Manual override and LED indication for each load
12. Dual voltage (120/277 VAC, 60 Hz), or 347 VAC, 60 Hz (selected models only). 120/277 volt models rated for 20A total load, derating to 16A required for some dimmed loads (forward phase dimming); 347 volt models rated for 15A

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total load; plug load controllers carry application-specific UL 20 rating for receptacle control.

13. Zero cross circuitry for each load
 14. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
- B. On/Off Room Controllers shall include:
1. One or two relay configuration
 2. Efficient 150 mA switching power supply
 3. Three RJ-45 DLM local network ports with integral strain relief and dust cover
 4. WattStopper product numbers: LMRC-101, LMRC-102
- C. On/Off/Dimming enhanced Room Controllers shall include:
1. Real time current monitoring
 2. Multiple relay configurations
 - a. One, two or three relays (LMRC-21x series)
 - b. One or two relays (LMRC-22x series)
 3. Efficient 250 mA switching power supply
 4. Four RJ-45 DLM local network ports with integral strain relief and dust cover
 5. One dimming output per relay
 - a. 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting. (LMRC-21x series)
 - b. Line Voltage, Forward Phase Dimming - Where indicated, one forward phase control line voltage dimming output per relay for control of compatible two-wire or three-wire ballasts, LED drivers, MLV, forward phase compatible ELV, neon/cold cathode and incandescent loads. (LMRC-22x series)
 - c. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver.
 - d. The LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.

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- e. Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100% dimming range defined by the minimum and maximum calibration trim.
 - f. Calibration and trim levels must be set per output channel.
 - g. Devices that set calibration or trim levels per controller are not acceptable.
 - h. All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.
- 6. Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events.
 - 7. Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.
 - 8. The following dimming attributes may be changed or selected using a wireless configuration tool:
 - a. Establish preset level for each load from 0-100%
 - b. Set high and low trim for each load
 - c. Set lamp burn in time for each load up to 100 hours
 - 9. Override button for each load provides the following functions:
 - a. Press and release for on/off control
 - b. Press and hold for dimming control
 - 10. WattStopper product numbers: LMRC-211, LRMC-212, LRMC-213, LMRC-221, LMRC-222

D. Plug Load Room Controllers shall include:

- 1. Not applicable to this project.

2.10 DLM LOCAL NETWORK (Room Network)

- A. The DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building.
- B. Features of the DLM local network include:
 - 1. Plug n' Go® automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.

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2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
 3. Push n' Learn® configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
 4. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.
- C. Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices are not acceptable.
- D. If manufacture's pre-terminated Cat5e cables are not used for the installation, the contractor is responsible for testing each cable following installation and supplying manufacturer with test results.
- E. WattStopper Product Number: LMRJ-Series

2.11 DLM SEGMENT NETWORK (Room to Room Network)

- A. The segment network shall be a linear topology, BACnet-based MS/TP subnet to connect DLM local networks (rooms) and LMCP relay panels for centralized control.
1. Each connected DLM local network shall include a single network bridge (LMBC-300), and the network bridge is the only room-based device that is connected to the segment network.
 2. Network bridges, relay panels and segment managers shall include terminal blocks, with provisions for separate "in" and "out" terminations, for segment network connections.
 3. The segment network shall utilize 1.5 twisted pair, shielded, cable supplied by the lighting control manufacturer. The maximum cable run for each segment is 4,000 feet. Conductor-to-conductor capacitance of the twisted pair shall be less than 30 pf/ft and have a characteristic impedance of 120 Ohms.
 4. Network signal integrity requires that each conductor and ground wire be correctly terminated at every connected device.
 5. Substitution of manufacturer-supplied cable must be pre-approved: Manufacturer will not certify network reliability, and reserves the right to void warranty, if non-approved cable is installed, and if terminations are not completed according to manufacturer's specific requirements.

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6. Segment networks shall be capable of connecting to BACnet-compliant BAS (provided by others) either directly, via MS/TP, or through NB-ROUTERS, via BACnet/IP or BACnet/Ethernet. Systems whose room-connected network infrastructure require gateway devices to provide BACnet data to a BAS are unacceptable.

B. WattStopper Product Number: LM-MSTP, LM-MSTP-DB

2.12 CONFIGURATION TOOLS

A. A wireless configuration tool facilitates optional customization of DLM local networks using two-way infrared communications, while PC software connects to each local network via a USB interface.

B. Features and functionality of the wireless configuration tool shall include but not be limited to:

1. Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.
2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
3. Must be able to read and modify parameters for room controllers, occupancy sensors, wall switches, daylighting sensors, network bridges and relay panels, and identify room devices by type and serial number.
4. Save up to eight occupancy sensor setting profiles, and apply profiles to selected sensors.
5. Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
6. Adjust or fine-tune daylighting settings established during auto-configuration, and input light level data to complete configuration of open loop daylighting controls.
7. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
8. Verify status of building level network devices.

C. WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100

2.13 NETWORK BRIDGE

A. The network bridge module connects a DLM local network to a BACnet-compliant segment network for communication between rooms, relay panels and a segment manager or BAS. Each local network shall include a network bridge component to

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provide a connection to the local network room devices. The network bridge shall use industry standard BACnet MS/TP network communication and an optically isolated EIA/TIA RS-485 transceiver.

1. The network bridge shall be provided as a separate module connected on the local network through an available RJ-45 port.
2. Provide Plug n' Go operation to automatically discover room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network.
3. The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the DLM room devices on each local network. BACnet objects will be created for the addition or replacement of any given in-room DLM device for the installed life of the system. Products requiring that an application-specific point database be loaded to create or map BACnet objects are not acceptable. Systems not capable of providing BACnet data for control devices via a dedicated BACnet Device ID and physical MS/TP termination per room are not acceptable. Standard BACnet objects shall be provided as follows:
 - a. Read/write the normal or after hours schedule state for the room
 - b. Read the detection state of each occupancy sensor
 - c. Read the aggregate occupancy state of the room
 - d. Read/write the On/Off state of loads
 - e. Read/write the dimmed light level of loads
 - f. Read the button states of switches
 - g. Read total current in amps, and total power in watts through the room controller
 - h. Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings
 - i. Activate a preset scene for the room
 - j. Read/write daylight sensor fade time and day and night setpoints
 - k. Read the current light level, in footcandles, from interior and exterior photosensors and photocells
 - l. Set daylight sensor operating mode
 - m. Read/write wall switch lock status
 - n. Read watts per square foot for the entire controlled room
 - o. Write maximum light level per load for demand response mode
 - p. Read/write activation of demand response mode for the room

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q. Activate/restore demand response mode for the room

B. WattStopper product numbers: LMBC-300

2.13 SEGMENT MANAGER

A. For networked applications, the Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser utilizing either unencrypted TCP/IP traffic via a configurable port (default is 80) or 256 bit AES encrypted SSL TCP/IP traffic via a configurable port (default is 443).

B. Each segment manager shall have integral support for at least three segment networks. Segment networks may alternately be connected to the segment manager via external routers and switches, using standard Ethernet structured wiring. Each router shall accommodate one segment network. Provide the quantity of routers and switches as shown on the plans.

C. Operational features of the Segment Manager shall include the following:

1. Connection to PC or LAN via standard Ethernet TCP/IP via standard Ethernet TCP/IP with the option to use SSL encrypted connections for all traffic.
2. Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser. Shall not require installation of any lighting control software to an end-user PC.
3. Log in security capable of restricting some users to view-only or other limited operations.
4. Automatic discovery of DLM devices and relay panels on the segment network(s). Commissioning beyond activation of the discovery function shall not be required to provide communication, monitoring or control of all local networks and lighting control panels.
5. After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.
6. Ability to view and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation including sensor time delays and sensitivities, and load response to sensor including Manual-On or Auto-On.
7. Ability to set up schedules for rooms and panels, view and override current status of panel channels and relays, and assign relays to groups. Schedules shall automatically set controlled zones or areas to either a normal hours or after hours mode of operation. Support for a minimum of 100 unique schedules, each with up to four time events per day. Support for annual schedules, holiday schedules and unique date-bound schedules.

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8. Ability to group rooms and loads for common control by schedules, switches or network commands.
 9. Ability to monitor connected load current and display power consumption for areas equipped with room controllers incorporating the integral current monitoring feature.
 10. Provide capabilities for integration with a BAS via BACnet protocol. At a minimum, the following points shall be available to the BAS via BACnet IP connection to the segment manager: room occupancy state; room schedule mode; room switch lock control; individual occupancy sensor state; room lighting power; room plug-load power; load ON/OFF state; load dimming level; panel channel schedule state; panel relay state; and Segment Manager Group schedule state control.
 11. The Segment Manager shall allow access and control of the overall system database via Native Niagara AX FOX connectivity. Systems that must utilize a Tridium Niagara controller in addition to the programming, scheduling and configuration server are not acceptable.
- D. Segment Manager shall support multiple DLM rooms as follows:
1. Support up to 120 network bridges and 900 digital in-room devices (LMSM-3E).
 2. Support up to 300 network bridges and 2,200 digital in room devices, connected via network routers and switches (LMSM-6E).
- E. WattStopper Product Numbers: LMSM-3E, LMSM-6E, NB-ROUTER, NB-SWITCH, NB-SWITCH-8, NB-SWITCH-16.

2.14 PROGRAMMING, CONFIGURATION AND DOCUMENTATION SOFTWARE

- A. PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handled IR configuration tool. Software must be capable of accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing standard BACnet/IP communication.
1. Additional parameters exposed through this method include but are not limited to:
 - a. Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.
 - b. Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after hours modes.

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Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.

- c. Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.
 - d. Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.
 - e. Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.
 - f. Load control polarity reversal so that on events turn loads off and vice versa.
 - g. Per-load DR (demand response) shed level in units of percent.
 - h. Load output pulse mode in increments of 1second.
 - i. Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer.
2. Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:
- a. Device list report: All devices in a project listed by type.
 - b. Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.
 - c. BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.
 - d. Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.
 - e. Device parameter report: Per-room lists of all configured parameters accessible via hand held IR programmer for use with O&M documentation.
 - f. Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100%, 2 = all loads 75%, 3 = all loads 50%, 4 = all loads 25%, 5-16 = same as scene 1).
 - g. Occupancy sensor report: Basic settings including time delay and sensitivity(ies) for all occupancy sensors.

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3. Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations:
 - a. Set, copy/paste an entire project site of sensor time delays.
 - b. Set, copy/paste an entire project site of sensor sensitivity settings.
 - c. Search based on room name and text labels.
 - d. Filter by product type (i.e. LMRC-212) to allow parameter set by product.
 - e. Filter by parameter value to search for product with specific configurations.
4. Network-wide firmware upgrading remotely via the BACnet/IP network.
 - a. Mass firmware update of entire rooms.
 - b. Mass firmware update of specifically selected rooms or areas.
 - c. Mass firmware upgrade of specific products.

B. WattStopper Product Number: LMCS-100, LMCI-100

2.15 LMCP LIGHTING CONTROL PANELS

- A. Provide lighting control panels in the locations and capacities as indicated on the plans and schedules. Each panel shall be of modular construction and consist of the following components:
 1. Enclosure/Tub shall be NEMA 1, sized to accept an interior with 1 - 8 relays, 1 - 24 relays and 6 four-pole contactors, or 1 - 48 relays and 6 four-pole contactors.
 2. Cover shall be configured for surface or flush wall mounting of the panel as indicated on the plans. The panel cover shall have a hinged and lockable door with restricted access to line voltage section of the panel.
 3. Interior assembly shall be supplied as a factory assembled component specifically designed and listed for field installation. The interior construction shall provide total isolation of high voltage (Class 1) wiring from low voltage (Class 2) wiring within the assembled panel. The interior assembly shall include intelligence boards, power supply, DIN rails for mounting optional Class 2 control devices, and individually replaceable latching type relays. The panel interiors shall include the following features:
 - a. Removable, plug-in terminal blocks with connections for all low voltage terminations.
 - b. Individual terminal block, override pushbutton, and LED status light for each relay.
 - c. Direct wired switch inputs associated with each relay shall support 2-wire momentary switches only.

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- d. Digital inputs (four RJ-45 jacks) shall support 1-, 2-, 3-, 4-, and 8-button digital switches; digital IO modules capable of receiving 0-5V or 0-10V analog photocell inputs; digital IO modules capable of receiving momentary or maintained contact closure inputs or analog sensor inputs; digital daylighting sensors; and digital occupancy sensors. Inputs are divided into two separate digital networks, each capable of supplying 250mA to connected devices.
- e. True relay state shall be indicated by the on-board LED and shall be available to external control devices and systems via BACnet.
- f. Automatically sequenced operation of relays to reduce impact on the electrical distribution system when large loads are controlled simultaneously.
- g. Group and pattern control of relays shall be provided through a simple keypad interface from a handheld IR programmer. Any set of relays can be associated with a group for direct on/off control or pattern (scene) control via a simple programming sequence using the relay override pushbuttons and LED displays for groups 1-8 or a handheld IR programmer for groups 1-99.
- h. Relay group status for shall be provided through LED indicators for groups 1-8 and via BACnet for groups 1-99. A solid LED indicates that the last group action called for an ON state and relays in the group are on or in a mixed state.
- i. Single-pole latching relays with modular plug-in design. Relays shall provide the following ratings and features:
 - a) Electrical:
 - b) 30 amp ballast at 277V
 - c) 20 amp ballast at 347V
 - d) 20amp tungsten at 120V
 - e) 30 amp resistive at 347V
 - f) 1.5 HP motor at 120V
 - g) 14,000 amp short circuit current rating (SCCR) at 347V
 - h) Relays shall be specifically UL 20 listed for control of plug-loads
 - b) Mechanical:
 - i) Replaceable, ½" KO mounting with removable Class 2 wire harness.

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- j) Actuator on relay housing provides manual override and visual status indication, accessible from Class 2 section of panel.
 - k) Dual line and load terminals each support two #14 - #12 solid or stranded conductors.
 - l) Tested to 300,000 mechanical on/off cycles.
4. Isolated low voltage contacts provide for true relay status feedback and pilot light indication.
5. Power supply shall be a multi-voltage transformer assembly with rated power to supply all electronics, occupancy sensors, switches, pilot lights, and photo-cells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.
6. Where indicated, lighting control panels designated for control of emergency lighting shall be provided with factory installed provision for automatic by pass of relays controlling emergency circuits upon loss of normal power. Panels shall be properly listed and labeled for use on emergency lighting circuits and shall meet the requirements of UL924 and NFPA 70 - Article 700.
7. Integral system clock shall provide scheduling capabilities for panel-only projects without DLM segment networks or BAS control.
- i. Each panel shall include digital clock capability able to issue system wide automation commands to up to (11) eleven other panels for a total of (12) twelve networked lighting control panels. The clock shall provide capability for up to 254 independent schedule events per panel for each of the ninety-nine system wide channel groups.
 - j. The clock capability of each panel shall support the time-based energy saving requirements of applicable local energy codes.
 - k. The clock module shall provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery back up for the clock function and program retention in non-volatile FLASH memory. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed.
 - l. The clock capability of each panel shall operate on a basis of ON/OFF or Normal Hours/After Hours messages to automation groups that implement pre-configured control scenarios. Scenarios shall include:
 - b) Scheduled ON / OFF
 - c) Manual ON / Scheduled OFF
 - d) Astro ON / OFF (or Photo ON / OFF)

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- e) Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)
 - m. The user interface shall be a portable IR handheld remote control capable of programming any panel in the system (LMCT-100)
 - n. The clock capability of each panel shall employ non-volatile memory and shall retain user programming and time for a minimum of 10 years.
 - o. Schedules programmed into the clock of any one panel shall be capable of executing panel local schedule or Dark/Light (photocell or Astro) events for that panel in the event that global network communication is lost. Lighting control panels that are not capable of executing events independently of the global network shall not be acceptable.
8. The lighting control panel can operate as a stand-alone system, or can support schedule, group, and photocell control functions, as configured in a Segment Manager controller, via a segment network connection.
9. The lighting control panel shall support digital communications to facilitate the extension of control to include interoperation with building automation systems and other intelligent field devices. Digital communications shall be RS485 MS/TP-based using the BACnet® protocol.
- a. The panel shall have provision for an individual BACnet device ID and shall support the full 2^{22} range (0 – 4,193,304). The device ID description property shall be writable via the network to allow unique identification of the lighting control panel on the network.
 - b. The panel shall support MS/TP MAC addresses in the range of 0 – 127 and baud rates of 9600k, 38400k, 76800k, and 115.2k bits per second.
 - c. Lighting control relays shall be controllable as binary output objects in the instance range of 1 – 64. The state of each relay shall be readable and writable by the BAS via the object present value property.
 - d. Lighting control relays shall report their true on/off state as binary input objects in the instance range of 1 – 64.
 - e. The 99 group Normal Hours/After Hours control objects associated with the panel shall be represented by binary value objects in the instance range of 201 – 299. The occupancy state of each channel group shall be readable and writable by the BAS via the object present value property. Commanding 1 to a channel group will put all relays associated with the channel into the normal hours mode. Commanding 0 or NULL shall put the relays into the after hours mode.
 - f. Setup and commissioning of the panel shall not require manufacturer-specific software or a computer. All configuration of the light-

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ing control panel shall be performed using standard BACnet objects or via the handheld IR programming remote. Provide BACnet objects for panel setup and control as follows:

- b) Binary output objects in the instance range of 1 – 64 (one per relay) for on/off control of relays.
- c) Binary value objects in the instance range of 1 – 99 (one per channel) for normal hours/after hours schedule control.
- d) Binary input objects in the instance range of 1 – 64 (one per relay) for reading true on/off state of the relays.
- e) Analog value objects in the instance range of 101 – 199 (one per channel group) shall assign a blink warn time value to each channel. A value of 5 shall activate the blink warn feature for the channel and set a 5-minute grace-time period. A value of 250 shall activate the sweep feature for the channel and enable the use of sweep type automatic wall switches.
- g. The description property for all objects shall be writable via the network and shall be saved in non-volatile memory within the panel.
- h. The BO and BV 1 – 99 objects shall support BACnet priority array with a relinquish default of off and after hours respectively. Prioritized writes to the channel BV objects shall propagate prioritized control to each member relay in a way analogous to the BACnet Channel object described in addendum aa.
(<http://www.bacnet.org/Addenda/Add-135-2010aa.pdf>)
- i. Panel-aggregate control of relay Force Off at priority 2 shall be available via a single BV5 object. Force On at priority 1 shall be available via a single BV4 object.
- j. Lockout of all digital switch buttons connected to a given panel shall be command-able via a single BV2 object. The lock status of any connected switch station shall be represented as BV101-196.

10. WattStopper Product Number: LMCP8, LMCP24 or LMCP48

B. USER INTERFACE

Each lighting control panel system shall be supplied with at least (1) handheld configuration tool (LMCT-100). As a remote programming interface the configuration tool shall allow setup, configuration, and diagnostics of the panel without the need for software or connection of a computer. The user interface shall have the following panel-specific functions as a minimum:

- 1. Set network parameters including panel device ID, MS/TP MAC address, baud rate and max master range.
- 2. Relay Group creation of up to 99 groups. Group creation shall result in programming of all seven key relay parameters for member relays. The seven parameters are as follows: After-hours Override Time Delay, Normal Hours Override Time Delay, Action on Transition to Normal Hours, Action on Transition to After Hours, Sensor Action During Normal Hours, Sensor Action During After Hours, Blink-Warn Time for After Hours.

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3. Program up to 254 separate scheduled events. Events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays. Holidays are also defined through the User Interface.
4. Program up to 32 separate Dark/Light events. Events shall have a selectable source as either calculated Astro with delay, or a digital IO module with an integral 0-5V or 0-10V analog photocell. Dark/Light events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays.
5. Button binding of digital switches to groups shall be accessible via the handheld IR remote and accomplished from the digital switch station.
6. Programming of panel location information shall be accomplished by the handheld IR remote and include at a minimum LAT, LON, DST zone, and an approximate city/state location.
7. An additional handheld IR remote may optionally be specified to be permanently mounted to the panel interior via a retractable anti-theft lanyard to allow for convenient programming of the panel while assuring that the handheld programmer is always present at that panel. An unlimited number of handheld IR remotes may also be purchased for facilities staff as determined by the end user's representative.
8. WattStopper Product Number: LMCT-100

2.16 EMERGENCY LIGHTING CONTROL DEVICES

- A. Emergency Lighting Control Unit – A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:
 1. 120/277 volts, 50/60 Hz, 20 amp ballast rating
 2. Push to test button
 3. Auxiliary contact for remote test or fire alarm system interface
- B. WattStopper Product Numbers: ELCU-100, ELCU-200.

PART 3 – EXECUTION

3.1 PRE-INSTALLATION MEETING

- A. A factory authorized manufacturer's representative shall provide the electrical contractor a functional overview of the lighting control system prior to installation. The contractor shall schedule the pre-installation site visit after receipt of approved submittals to review the following:

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1. Confirm the location and mounting of all digital devices, with special attention to placement of occupancy and daylighting sensors.
2. Review the specifications for low voltage control wiring and termination.
3. Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.
4. Discuss requirements for integration with other trades.

3.2 CONTRACTOR INSTALLATION AND SERVICES

- A. Contractor to install all devices and wiring in a professional manner. All line voltage connections to be tagged to indicate circuit and switched legs.
- B. Contractor to install all room/area devices using manufacturer's factory-tested Cat 5e cable with pre-terminated RJ-45 connectors. If pre-terminated cable is not used for room/area wiring, the contractor is responsible for testing each field-terminated cable following installation, and shall supply the lighting controls manufacturer with test results. Contractor to install any room to room network devices using manufacturer-supplied LM-MSTP network wire. Network wire substitution is not permitted and may result in loss of product warranty per DLM SEGMENT NETWORK section of specification. Low voltage wiring topology must comply with manufacturer's specifications. Contractor shall route network wiring as shown in submittal drawings as closely as possible, and shall document final wiring location, routing and topology on as built drawings.
- C. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated. Before start up, contractor shall test all devices to ensure proper communication.
- D. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.
 1. Adjust time delay so that controlled area remains lighted while occupied.
- E. Provide written or computer-generated documentation on the configuration of the system including room by room description including:
 1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
 2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
 3. Load Parameters (e.g. blink warning, etc.)
- F. Post start-up tuning – After 30 days from occupancy contractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Architect / Owner of post start-up activity.

3.3 FACTORY SERVICES

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- A. Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system.
- B. The electrical contractor shall provide both the manufacturer and the electrical engineer with three weeks written notice of the system start up and adjustment date.
- C. Upon completion of the system start up, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

3.4 COMMISSIONING SUPPORT SERVICES

- A. On this project, a commissioning agent will be hired to verify the installation and programming of all building systems, which includes the lighting control system. Manufacturer should include an extra day of technician's time to review the functionality and settings of the lighting control hardware with the commissioning agent, including reviewing submittal drawings and ensuring that instructions on how to configure each device are readily available. Manufacturer is NOT responsible for helping the commissioning agent inspect the individual devices. It will be the commissioning agent's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the agent with this task.
- B. The commissioning agent shall work with the electrical contractor during installation of the lighting control hardware to become familiar with the specific products. The agent may also accompany the manufacturer's technicians during their start-up work to better understand the process of testing, calibration and configuration of the products. However, the contractor and manufacturer shall ensure that interfacing with the agent does not prevent them from completing the requirements outlined in the contract documents.

END OF SECTION

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SECTION 27 05 26

TELECOMMUNICATIONS GROUNDING PROTECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, sections included under Divisions 1, 26, and 27 are included as part of this section as though bound herein.
- B. Section 27 01 00 General Requirements
- C. Section 27 15 00 Horizontal Cabling

1.2 SUMMARY

- A. This Section specifies the minimum materials and performance standards for grounding and bonding installed specifically for telecommunication systems in new construction and remodels.
 - 1. Sections include:
 - a. Grounding electrodes and conductors.
 - b. Grounding electrodes.
 - c. Equipment grounding conductors.
 - d. Bonding.

1.3 REFERENCES

- A. American National Standards Institute (ANSI) Publication C2-97 – National Electrical Safety Code; ANSI/IEEE Std. 1100-1999 – Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems; ANSI/NFPA 780 – Lightning Protection Code Electronic Industries Association and Telecommunication Industries Association (EIA/TIA) Publications:
 - 1. EIA/TIA 568B – Commercial Building Telecommunications Wiring Standard.
 - 2. EIA/TIA 569 – Commercial Building Standard for Telecommunications Pathways.
 - 3. EIA/TIA 607 – Grounding and Bonding for Communications.
- B. Institute of Electrical and Electronic Engineers (IEEE) Publication 142 – Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- C. National Fire Protection Association (NFPA) Publication:
 - 1. 70 – National Electrical Code (NEC).
 - 2. 780 – Lightning Protection Code.
- D. Underwriters Laboratories, Inc. (U.L.) Publication:
 - 1. 83 - Thermoplastic Insulated Wires.
 - 2. 467 - Grounding and Bonding Equipment.

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3. 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.

1.4 REGULATORY REQUIREMENTS

- A. The Contractor shall conform to requirements of the National Electrical Code Article 250, California Electrical Code, and requirements for EIA/TIA 607.
- B. The Contractor shall furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to the SDUSD as suitable for purpose specified and shown.

1.5 PERFORMANCE REQUIREMENTS

- A. Grounding system resistance shall be 5 ohms or less unless otherwise indicated.
- B. A telecommunications ground in the form of telecommunication main ground busbar (TMGB) shall be installed in the Main Distribution Frame (MDF) cabinet. It will be directly attached and effectively bonded to the closest point in the building's electrical service grounding electrode system.
- C. In the event the building's service grounding electrode system is not in close proximity of the TMGB, install a driven ground rod for the telecommunication grounding system.
- D. Each Building Distribution Frame (BDF) shall be effectively bonded with the TMGB in the MDF. Each BDF ground shall be a separate grounding conductor between the BDF and the MDF.

1.6 SUBMITTALS:

- A. The following information shall be submitted for review and approval in accordance with Section 16010, "General Electrical Requirements".
 1. Catalog Cut:
 - a. Ground Rod.
 - b. Ground Connectors
 - c. Telecommunications Main Grounding Busbar.
 2. Ground resistance from each major piece of equipment to the ground electrode. Equipment shall include, but not be limited to the following:
 - a. Main Distribution Frame (MDF).
 - b. Building Distribution Frame (BDF).

1.7 WARRANTY

- A. Warranty shall comply with the provisions of Section 26 01 00, "General Electrical Requirements".

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PART 2 - PRODUCTS

2.1 Telecommunication Main Grounding Bus Bar (TMGB):

- A. Provide 2" wide x 3/16" thick copper ground bus, (length as necessary to accommodate all MDF/BDFIDF ground connections).

2.2 GROUND RODS:

- A. Provide copper clad steel with adequate diameter to permit driving it full length of the rod in the earth but not less than 3/4-inch. Length shall be 10-feet unless otherwise indicated.

2.3 GROUNDING AND BONDING CONDUCTORS

- A. Grounding and bonding conductors shall be sized in accordance with Table for equipment grounding conductors, NEC. 250, ANSI/TIA/EIA – 607.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Make mechanical and electrical contact at all MDFs and BDFs. Permanently and effectively ground all equipment as required by all applicable codes, regulations and standards.
- B. Drive ground rods full length in a depression at least six (6)-inches below finished grade.
 - 1. Provide minimum No. 4/0 AWG, insulated, stranded copper grounding conductor between TMGB in MDF and electrical system ground
 - 2. Provide minimum No. 6 AWG, insulated, stranded copper grounding conductor between individual BDFs and the MDF TMGB.

3.2 TESTS:

- A. All testing shall be performed by the technology contractor and shall be witnessed by the Architect and/or the District's designated representative.
- B. As an exception to requirements that may be stated elsewhere in the contract, the Consultant shall be given five (5) working days notice prior to each test.
- C. The testing equipment and devices used in performing the required tests shall have a calibration sticker affixed to the device stating the date when calibrated, date due for re-calibration, and the signature of the individual who did the calibration. In addition to the sticker, a certificate shall also contain the brand name and the serial number of the device.
- D. Ground Rod Test: Test ground rods for ground resistance value before any wire is connected. A portable testing megger shall be used to test each ground or group of grounds. The auxiliary or reference ground rods shall be 3/4-inch copper clad steel,

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not less than 4-feet in length and driven 3-1/2 feet deep, and shall be installed in a straight line from the ground being tested. Number 14 AWG stranded wire leads with at least 600 volt rubber insulation shall be connected to binding post on the instrument.

1. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground electrode under test. Provide one (1) copy of the megger manufacturer's directions for use of the ground megger indicating the methods to be used.
- E. Test Report (Submit four (4) copies in writing):
1. Grounding electrodes and systems (identifying electrodes and systems, each test).

END OF SECTION

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SECTION 27 21 00

DATA NETWORKING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. General Requirements
- B. Scope: Data, Telephone/Voice
- C. Industry Guidelines and Standards
- D. Submittals

1.2 GENERAL REQUIREMENTS

- A. Manufacturer: The term "manufacturer" shall be defined as the company, or group of companies, that actually produces the products meeting the requirements of Section 2 of this document. The manufacturer shall have a minimum of seven (7) years experience in manufacturing products of this type and shall be ISO 9001 Certified.
- B. Contractor: The term "contractor" shall be defined as the company, or group of companies, that actually installs the product. The contractor selected to provide the installation of this system shall be certified by the manufacturer in all aspects of design, installation and testing of the products described herein.
 - 1. The contractor shall hold a valid State of California C-7 Or C-10 Contractor's license, shall have completed at least ten (10) projects of equal scope, shall have been in business of furnishing and installing systems of this scope and magnitude for at least three (3) years and capable of being bonded to assure the Owner's Project Manager of performance and satisfactory service during the guarantee period.
 - 2. The contractor shall hold all other licenses required by the legally constituted authorities having jurisdiction over the work.
 - 3. All work shall be performed under the supervision of a company accredited by the manufacturer and such accreditation must be presented.
 - 4. The contractor shall be a manufacturer's authorized distributor and warrantee station for the equipment offered and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The contractor shall maintain a spare set of all major parts for the system at all times.
 - 5. The contractor selected for this Project must adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.
 - 6. The contractor shall own and maintain tools and equipment necessary for successful installation and testing of optical and Category 6 and 6A metallic premise distribution systems and have personnel who are adequately trained in the use of such tools and equipment.
 - 7. All of the equipment in this specification shall be furnished and installed by the Authorized Factory Distributor of the equipment. The Contractor shall furnish a

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letter from the manufacturer of all major equipment, which certifies that the installing contractor is the Authorized Distributor and that the equipment has been installed according to factory intended practices. The Contractor shall furnish a written guarantee from the manufacturer that they will have a service representative assigned to this area for the life of the equipment.

8. All communication system supplied shall be listed by Underwriter's Laboratories under UL Standard 1459. A copy of the UL listing card for the proposed system shall be included with the contractor's submittal.

- C. Responsible Person for Contractor: Submit name of the individual authorized to receive construction change documents, and who is responsible for informing others in Contractor's employ or subcontractors of changes in the Work.

1.3 SCOPE OF WORK

- A. DATA: The work shall include, but not be limited to the following objectives:
 1. Furnish and install Data Communications System including all wiring and connections and other materials as shown on Plans and specified herein.
 2. The installation shall include cable (fiber optic and twisted-pair copper), fiber optics raceway, fiber interconnect equipment, connectors (fiber and copper), jumpers (fiber optic and twisted-pair copper), wiring blocks, data and phone communications outlets, racks, enclosures, and passive distribution equipment. Additionally, Contractor shall provide labor and any incidental material required for installation.
 3. All data jacks and cables shall be blue in color.
 4. All Wireless Access Point jacks and cables shall be green in color.
 5. Horizontal Pathway: Conform to TIA/EIA 568-B, using raceway, backboards, and cabinets as indicated.
 6. Ground System: Conform to TIA/EIA 607. Installer must adhere to the TIA 942 Datacenter Standards.
 - o Data Backbone Wiring: Complete from the Main Distribution Frame (MDF) to each Intermediate Distribution Frame (IDF), using optical fiber backbone cables.
 7. Data Horizontal Wiring: Complete from horizontal connections to each outlet using unshielded twisted pair and optical fiber backbone cables. Provide and install new MDF as indicated on plans. Contractor shall coordinate closely with District for required time to complete connection.
 8. Only virgin materials shall be used in the construction of cabling.
 9. Furnish and install for data cabinet, copper patch panels, UPS, and wire management hardware as required by the quantities shown drawings or the scope of work.
 10. Switches provided and installed by district.
 11. Testing of cables and connections to insure a complete and operable end-to-end data connection using EIA/TIA TSB-67 testing guidelines at level II accuracy for Category 6 and 6A.
 12. All terminations into patch panel for connection to Switches using contractor supplied patch cords/station cables. For each data cable installed, the contractor shall supply one (1) 1' Category 6 and 6A patch cord for the patch panel location. Station cords shall be delivered as directed by computer services in boxes clearly labeled with School name, quantity and size of station cords. District to install patch cords from patch-panel to switches.
 13. Warranty:

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- a. Contractor shall warrant the installation and that all approved cabling components meet or exceed the requirements of TIA/EIA-568A, TIA/EIA-568A-A5, and ISO/IEC 11801.
- b. Contractor must fully warrant proper operation of installed system and components for a minimum of 25 years after system turnover to Owner. The Contractor shall provide a "performance" level warranty.
- c. The permanent link cabling system shall be warranted for a period of at least 25 years.
- d. The contractor will provide a two (2) year written warranty covering workmanship and materials in compliance with District specifications. All repairs shall be made at no cost to District during the warranty period.
- e. Contractor will provide to the District warranty information covering parts and materials used by the contractor.
- f. Upon hookup of system and system start-up by District, if system troubles should indicate problems with the cables or terminations, it shall be the responsibility of the cable installation contractor to repair any such problems free of charge to the District. The contractor shall start this repair work within a 48 hour period of time from initial notification by District.

B. TELEPHONE/VOICE: The work shall include but not be limited to the following objectives:

1. Only virgin materials shall be used in the construction of cabling.
2. Backbone feeder cables shall be Category 6 and 6A, size and number of pairs as indicated in drawings and Scope of Work documents. All pairs are to be terminated on 66m, 50 blocks and 89B standoffs.
3. All 66 blocks shall be mounted on blue-boards located in or near data cabinets.
4. Each 66-block shall have a minimum of a mushroom block and mushrooms installed per drawing details.
5. Installation of new Category 6 and 6A UTP in rooms as indicated on the drawings. Category 6 and 6A terminations will be EIA/TIA standard 568B wiring configuration into RJ45 workstation jacks (all telephone wire and jacks shall be blue in color). All cables shall be installed with service loops at ground boxes and MDF/IDF/CIDF locations only.
6. Testing of cables and connections to insure a complete and operable end-to-end data connection using EIA/TIA TSB-67 testing guidelines at level II accuracy for Category 6 and 6A.

C. INDUSTRY GUIDELINES AND STANDARDS

1. When Contract Documents differ from governing codes, furnish and install larger size or higher standards called for without extra charge. Notify the District Representative of any discrepancies prior to commencement of construction. Obtain written clarification prior to proceeding with work.
2. Electrical cable, wire and connectors shall be installed as indicated, in accordance with the manufacturer's written instructions, the applicable requirements of NEC and the National Electrical Contractors Association's "Standard of Installation", and in accordance with recognized industry practices to ensure that products serve the intended functions.
3. The National Fire Code (NFPA), National Electrical Code (NEC), California Electrical Code (CEC), California Building Code and Local Codes will be followed.
4. Applicable Standards
 - a) National Electrical Code (NEC), most recent edition.

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- b) ANSI/TIA/EIA-568-B -- Commercial Building Telecommunications Cabling Standard ANSI/TIA/EIA-568-A-1 -- Propagation Delay and Delay Skew Specifications for 100 ohm 4-pair Cable.
- c) ANSI/TIA/EIA-568-A-2 - Commercial Building Standards Updates
- d) ANSI/TIA/EIA-569-A -- Commercial Building Standard for Telecommunications Pathways and Spaces.
- e) ANSI/TIA/EIA-606 -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
- f) ANSI/TIA/EIA-607 -- Commercial Building Grounding and Bonding Requirements for Telecommunications.
- g) ANSI/TIA/EIA TSB-67 -- Transmission Performance Specifications for Field-testing of Unshielded Twisted-Pair Cabling Systems.
- h) ANSI/TIA/EIA TSB-75 -- Additional Horizontal Cabling Practices for Open Offices.
- i) BICSI -- Telecommunications Distribution Methods Manual.
- j) BICSI -- Cabling Installation Manual.
- k) IEEE 802.3 "Carrier Sense Multiple Access with Collision Detection".
- l) IEEE 802.3ab "Gigabit Ethernet transmission over unshielded twisted pair (UTP)"
- m) IEEE 802.z "1000Base-SX transmission over multi-mode fiber and 1000Base-LX transmission over single-mode fiber
- n) ISO/IEC DIS 11801, January 6, 1994.
- o) UL Cable Certification Program.
- p) ANSI X3T9.5 Requirements for UTP at 100 Mbps.
- q) EIA/TIA Technical Specification Bulletin 36. Technical Systems Bulletin additional Cable Specifications for Unshielded Twisted-Pair Cables.
- r) EIA/TIA Technical Specification Bulletin 40. Technical Systems Bulletin additional Transmission Specifications for Unshielded Twisted-Pair Connecting Hardware.
- s) TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
- t) EIA/TIA-455-61 FOTP-61 Measurement of Fiber or Cable Attenuation Using an OTDR.
- u) ANSI/EIA/TIA-455-A-1991 Standard Test Procedures for Fiber Optic Fibers, Cables and Transducers, Sensors, Connecting and Terminating Devices, and other Fiber Optic Components
- v) ANSI/ICEA S-83-596-1994, Fiber Optic Premises Distribution Cable.
- w) ANSI/ICEA S-87-640-2000, Fiber Optic Outside Plant Communications Cable.
- x) ANSI/TIA/EIA-526-7-1998, Optical Power Loss Measurements of Installed Single-mode Fiber Cable Plant-OFSTP-7.
- y) ANSI/TIA/EIA-526-14-A-1998, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant-OFSTP-14A.
- z) ANSI/TIA/EIA-598-A-1995, Optical Fiber Cable Color Coding.
- aa) ANSI/TIA/EIA-604-3-1997, FOCIS 3 Fiber Optic Connector Intermateability Standard.

1.4 SUBMITTALS

A. Pre-construction material submittals

1. Whenever in the Contract Documents any materials, products, processes or articles are indicated or specified by the name brand of the manufacturer, or by patent or

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proprietary names, such specifications shall be deemed to be a measure of quality and utility or a standard, and shall be deemed to be followed by the words, "or equal". It is the intent of this article to comply with Public Contract Code Section 3400.

- B. Proposed Product Substitutions
 - 1. All proposed product substitutions shall be requested as per Section Product Substitution Procedures.

1.5 LOW VOLTAGE ENCLOSURES AND PATHWAYS

- A. Mounting hardware and anchors recommended by the Manufacturer of any material that shall be mounted to the building or structure.
 - 1. Sheetrock/drywall/wall board: Easy Anchor, toggle bolt, other spread type anchor with load distribution, or approved equal.
 - 2. Concrete/cinder block/solid masonry: expanding compression type lag, expanding compression type bolt, expanding compression type all tread with nuts, or approved equal.
 - 3. Tile/Stucco/hollow masonry: toggle bolts or approved equal.
 - 4. Wood: lags, wood screws, or approved equal.
 - 5. Metal: clamp, or approved equal.
- B. Surface Mount Boxes will be Wiremold 2944 Extra Deep Device Box.
- C. Definitions:
 - 1. A rack is defined as a sideless, bottomless, topless open-rammed support structure for equipment. A rack may be mounted to a wall, ceiling, or to a floor depending on type, size, and District requirements.
 - 2. A cabinet is defined as an enclosed equipment support structure with opening front and rear. A cabinet may be mounted to a wall, or to a floor depending on type, size, and District requirements.
 - 3. All cabinets and swing able racks must be able to open fully with no cable tension, or obstructions.

PART 2 - PRODUCTS

2.1 RACKS

- A. Racks.
 - 1. Rack shall be wall mount Chatsworth Cube-it Plus cabinet, 48"H x 24" W x 30" D with solid door and vents, black in color.
- B. Copper Backbone Cable
 - 1. BICC General or approved equal. Products must be approved by VUSD IT staff.
 - 2. Product Description: TIA/EIA 568B, BICC General PE 39 OSP CABLE, 24 AWG annealed copper conductors twisted into pairs of varying lengths and colors coded to telephone industry standards.
 - 3. Manufacturers:
 - a. Gen Speed 12pair PE39 OSP - 7524622

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- b. Gen Speed 25pair PE39 OSP - 7524648
- c. Gen Speed 50pair PE39 OSP – 7524655
- d. Gen Speed 100pair PE39 OSP- 7524671

C. All wiring and devices must be from a single manufacturer, or from a group of manufacturers that have teamed together to provide a system solution guaranteed to meet the performance specification.

D. Telecommunications Grounding Busbar:

- 1. Panduit or approved equal
- 2. Must adhere to the 942 Datacenter Grounding Standards
- 3. Product Description: Panduit pt# GB4B0624TPI-1 or equal. U.L. listed, predrilled, electrotin plated copper busbar with holes for standard sized lugs mounted on 2 inch insulators.

E. Patch Panel:

- a. Product Description: TIA/EIA 568B, UL 1863 compliant, Panduit DP24688TP, DP48688TP, NK5EPP48, 24 OR NKMP48, 24 and with modular NK6TMBU OR NK5E88MWH (voice) jacks on rear, 48 capacity patch panel. Provide enough patch panel ports for an additional 20%. If less than 6 ports are available for future growth, provide additional NK5EPP24 OR DP24688TP 24 port panel. All spare ports shall be labeled as SPARE.

F. Voice Cross-Connect:

- a. Product Description: Panduit CP24WSBLY and CP48WBLY with modular jacks on rear, 48 capacity patch panel. Provide enough patch panel ports for an additional 20%. If less than 6 ports are available for future growth, provide additional NK5EPP24 24 port panel. All spare ports shall be labeled as SPARE.

G. Voice Horizontal Cable:

- a. Product Description: TIA/EIA 568B General Cable, Gen Speed 6000, Category 6, balanced twisted pair cable CMP and CMR, with 4 pairs, 24 AWG copper conductors. All horizontal cables shall be from one manufacturer, and preferably from the same lot.
- b. Color: Blue

H. Data Horizontal Cable:

- a. Product Description: TIA/EIA 568B General Cable, Gen Speed 6000, Category 6 and 6A, balanced twisted pair cable CMP and CMR, with 4 pairs, 24 AWG copper conductors. All horizontal cables shall be from one manufacturer, and preferably from the same lot.
- b. Color: Blue

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I. Wireless Access Data Horizontal Cable:

- a. Product Description: TIA/EIA 568B General Cable, Gen Speed 6000, Category 6 and 6AA, balanced twisted pair cable CMP and CMR, with 4 pairs, 24 AWG copper conductors. All horizontal cables shall be from one manufacturer, and preferably from the same lot.
- b. Color: Green

J. Communications Outlets:

- a. Product Description: Conform to TIA/EIA 568B requirements for cable connectors for specific cable types, and conform to UL 1863 standard.
- b. White wall plate with capacity for NK5E88WH or NK6TMBU jacks, Panduit NK4F. Provide modular kit for furniture installations, Panduit NK4MFBL or equal (confirm color with owner prior to ordering and installation).
Voice insert jacks, one 8 pin non-keyed modular jacks, TIA/EIA 568B category 5E, Panduit NK5E88MWH with wire range of 22 to 24 AWG. Pin sequence shall be TIA/EIA-568A. Color code International White and label jacks "V1".
Data insert jacks, quantity as indicated, 8 pin non-keyed modular jacks, TIA/EIA 568B category 5E, Panduit NK6TBMBU with wire range of 22 to 24 AWG. Pin sequence shall be TIA/EIA-568-A. Jacks are to be labeled per District's requirements.

Use Panduit NetKey p/n's NK5E88MEI for Voice and NK6TMOR for Data Terminations in Floor Fed KeyStone boxes located on the first floor.

K. Patch Cords:

1. Patch Cables shall be sufficient length to provide a neatly routed connection from the patch Panel; nominally ranging in 3 to 7 feet in length.
2. Panduit patch cables PT # UTPSP3BU (Data) / UTPCHWH (Voice) - length

L. Cable Supports:

1. Manufacturers: Cablo Fil, Panduit JPRO, Panduit J MOD or approved equal
2. Product Description: CabloFil metal tray for supporting Category 5E
3. Horizontal Cabling for Main cable pathway. Wide Base J hooks or Cable Slings mounted to ceiling wires for smaller cable pathways. Clips shall comply with UL, CUL, CEC and TIA/EIA requirements for structured cabling systems. See drawing details.

M. Labels:

1. Manufacturers: Panduit
2. Product Description: wrap-around smoke rated labels, neatly hand written or printed by a mechanical means.

N. Routers:

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1. Specify 2651XM routers with two 10/100 ports, IP only IOS; an optional WIC T-1 can be added. Or approved equal.
- O. Uninterruptible Power Supplies:
1. UPS shall be Tripp Lite Part Number AMART 1500MXLN.

PART 3 - EXECUTION

3.1 GENERAL REQUIRMENTS

- A. The wiring of the system shall be executed in accordance with the drawings and the equipment manufacturer's wiring diagrams. Should any variations in these requirements occur, the contractor shall notify the Owner's Representative before making any changes. It shall be the responsibility of the manufacturer-authorized distributor of the approved equipment to install the equipment and guarantee the system to operate as per plans and specifications.
- B. Furnish all conductors, equipment plugs, terminal strips, etc., and labor to install a complete and operable system.
- C. Splices of conductors in underground pull boxes are not permitted.
- D. The labor employed by the contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the Owner's Representative to engage in the installation and service of this system.
- E. The contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc. The contractor shall remove all debris and rubbish occasioned by the electronic systems work from the site. The contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., caused by the performance of this work.
- F. The system must meet all local and other prevailing codes.
- G. All cabling installations shall be performed by qualified technicians.
- H. All cabling shall be splice free.
- I. In order to ensure the least amount of cable untwisting, it is required that all cables shall be stripped using a special tool.
- J. The use of lubricants (i.e. Blue 77) to facilitate the installation of cables in conduits is highly discouraged. If such a lubricant must be used, the contractor shall verify the acceptability of the lubricant to be used with the cable manufacturer, prior to using such a lubricant. Lubricants that harden after installation are not allowed.
- K. Under no circumstance are "channel locks" or other pliers to be used.

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- L. Plenum rated cable may be run exposed above ceilings, provided the cabling is supported independent of other utilities such as conduits, pipes, and the ceiling support systems. The cable shall not be laid directly on the ceiling panels. The use of cable ties shall be done in accordance with the cable manufacturer's requirements. The cable jacket composition must meet local and all other prevailing fire and safety codes.
- M. All firewalls penetrated by structured cabling shall be sealed by use of a non-permanent fire blanket or other method in compliance with the current edition of national Fire Protection Association (NFPA) and the National Electric Code (NEC) or other prevailing code. The contractor must not use concrete or other non-removable substance for fire stopping on cable trays, wire ways or conduits.
- N. Site Cleaning. Throughout the progress of the plant construction, the contractor shall keep the working area free from debris of all types and remove from the premises all rubbish resulting from any work done by Contractor. On a daily basis and at the completion of its work the Contractor shall, to the extent possible, leave the premises in a clean and finished condition.
- O. Conduits. All backbone cabling will run through dedicated conduits. All new conduits will be supplied with a pull string. Contractor shall supply pull string and pull rope for the installation of all cables in existing conduits. For all conduits left with available capacity, Contractor shall replace pull strings with 1/4-inch pull rope during the course of his work. Contractor must seal all conduits with an approved sealing compound.
- P. Cabling and Termination Identifications. All new cabling shall be of the type specified herein. Any conflicts between cabling types specified and code or design requirements shall be submitted to Owner's Representative for review and final disposition. All cabling shall be neatly laced, dressed and adequately supported. Cabling must be concealed to the fullest extent possible. In addition, a numbering and marking scheme must be used to identify all cable and cabling terminations. All cables, regardless of length, shall be marked and/or numbered at both ends. Marking codes and methodologies shall correspond to the instructions in this specification.
- Q. Seismic Requirements. Contractor will install all equipment racks, equipment cabinet enclosures, cable runways, etc. according to the local, state and/or federal code. Contractor will notify Owner's Representative of such requirements and shall provide such bracing as required.
- R. Safety Requirements. Contractor will utilize appropriate personnel and display warning signs, signals, flags and/or barricades at the work site to ensure adherence to safety regulations and as prudence requires.
- S. Owner or Owner's Representative may view work or testing in progress.

3.2 CABLE ROUTING

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- A. The cables will be routed to their respective Main Distribution Frame (MDF), Intermediate Distribution Frame (IDF), or to service drop utilizing the shortest path possible.
- B. Cable shall not be exposed at any point in the cable path. Contractor is to use appropriate pathway for the situation (i.e. inside wall, conduit, or non metallic surface raceway). EXCEPTION: In MDF ROOM ONLY cables may be exposed and routed in contractor supplied D-rings every 4 feet. J-hooks are acceptable above suspended ceiling tiles.
- C. Cables shall be protected and sleeved with a conduit in locations where cables need to pass through walls, floors, or hard ceilings. Contractor shall install threaded IMC or rigid conduit with large fender washers, lock rings, and screw on protective bushings on both ends. The fire rating of the wall must be maintained during and after installation.
- D. At solid wall location such as plaster, brick, concrete, cinder block, tile, reinforced concrete, Contractor will provide and install surface mounted non-metallic raceways or equivalent. The use of different series raceways is required at locations where cable fill capacities are exceeded.
- E. Terminations on block walls will be accomplished with District approved surface mount boxes.
- F. Cables will be run vertically inside the wall and into the ceiling space. Terminations on stud walls will be accomplished with cut-in type electrical boxes with a 1" conduit (flex or EMT) extended from the box within the wall to ceiling access space.
- G. Service loops:
 - 1. Category 6 and 6A (Data and Voice)
 - a. Shall be a minimum of 6'.
 - b. Shall be a minimum of 6' at all ground box locations that allow for the minimum bend radius specified by the manufacturer.
 - 2. Category 6 and 6A Voice Feeder Cables
 - a. Shall be routed around the perimeter of the backboard in which it is terminated on.
 - b. All ground boxes shall have a minimum of 6' service loop.
- H. Cables shall be run in corridors wherever possible in order to avoid furniture and work areas so that access to the cables is unencumbered.
- I. The cables are to be as accessible as possible, placed above all other items in the ceiling, including ducts and supports.
- J. Do not use pulling means, including fish tape, cable or rope, which can damage the Wiremold raceway.
- K. Use pulling compound or lubricant that will not deteriorate cable or conduit.
- L. Pulling compound shall be a water base pulling lubricant that will not deteriorate cable or

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conduit.

- M. Cables shall not be pulled across sharp edges. If sharp edges are present a small sleeve, insuliner or grommet shall be installed to protect the cable.
- N. Cables shall be pulled free of sharp bends or kinks.
- O. Cables shall not be forced or jammed between metal parts, assemblies, etc.
- P. Cables shall not be pulled across access doors and pull box covers. Access to all equipment and systems shall be maintained.
- Q. Manufacturer's specifications for pulling stress and minimum bend radius shall not be exceeded on any cable.
- R. Do not use staples or drive rings.

3.3 CABLE INSTALLATION PARAMETERS

- A. Contractor is required to adhere to the following parameters in this section whether or not existing equipment has been placed by Contractor and/or others.
- B. Contractor will notify District of any of the following requirements that cannot be met prior to bid.
- C. Data UTP specifications.
 - 1. Data terminations shall be T568B configuration unless otherwise specified
 - 2. Category 6 and 6A modular patch panels shall be installed in accordance with manufacturer's design and installation guidelines.
 - 3. Data UTP Testing
 - a. All data UTP cable shall be tested after installation according to the procedures and acceptability criteria described in EIA/TIA Standards for Category 6 and 6A cable and connecting hardware. Test at level 11 compliance.
 - b. Data UTP cable shall meet or exceed requirements for 1 Gbps data transmission.
 - c. Network certification of all four (4) pair will meet testing criteria for a minimum of 1000BASE-TX
 - d. Printed test results (both printed copy and data file copy) shall be provided as documentation of the quality of installation procedures and as a baseline for future troubleshooting.
 - e. All UTP testing equipment shall have current calibration certification.
- D. NOT USED.
- E. A maximum fill capacity of 40% will be deemed acceptable for conduits and 75% of raceway and surface mold. Contractor shall inform Consultant in writing if this requirement cannot be met. If the Contractor fails to inform the Consultant any labor involved in rerouting cables in such conduit or raceways shall be the soul responsibility of the Contractor.

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- F. Cable shall be identified with a machine-printed tag identifying the system type in all access points (i.e. junction boxes, ground boxes, MDF, IDF's, etc.) and as they enter or exit the conduit pathway.
- G. Contractor will assess whether or not the ceiling space is a plenum air return which shall dictate the use of the listed plenum type or PVC type cable required in the materials specification section. Any cable installations that shall be pulled through underground conduit will require Outside Plant (OSP) cable.
- H. All cabling shall be installed with proper stress relief and tied down.
- I. Manufacturer's specification for pulling stress and minimum bend radius shall not be exceeded on any data, voice or any other cable.
- J. Power feeds of greater than 220 volts shall not be run parallel to the UTP cables. Parallel runs of greater than 20 feet require a minimum separation distance of 3 feet, or 18 inches if cables are contained in a metallic conduit, which is grounded.
- K. Multiple conduit runs of 110 volts power distribution shall not be run parallel to the UTP cables. Parallel runs of greater than 20 feet require a minimum separation distance of 18 inches.
- L. All power feeds crossing the path of the UTP cables at right angles shall be a minimum of 6 inches in distance from the UTP cables.
- M. There shall be an 18 inch separation between the cables and the fluorescent light fixtures. Contractor shall notify District representative in the event this requirement can not be met.
- N. All cable/cabling shall be kept 30 inches away from any heat source; i.e., HVAC ducting, steam valves, etc.
- O. NOT USED.
- P. Station Cable (UTP) or STP runs are not to exceed 295 feet for data and 1000 feet for voice.
- Q. Cable splicing at any point of a UTP or STP station cable or any cable installed by the contractor is unacceptable without specific district approval.
- R. No cabling is allowed to rest on any ceiling tile or suspension system unless specifically authorized by District. Strapping or mounted to any existing wires (e.g., lighting, ceiling grid, etc.) is not permitted.
- S. Cables shall be securely supported to building structure (i.e. stud, beam, or other framing member) within 12 inches of any conduit or raceway entrance.
- T. Contractor will place all station cables in the ceiling area on Contractor supplied and installed wire hangers or in floor spaces and raceways.
- U. Insulation shall be removed to expose shielding and conductors/fibers to the exact

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length required by manufacturer for proper termination of plugs, pins and fiber terminations.

1. Wires and shielding shall not be nicked or damaged in any way upon termination of pins and closure of plug assembly.
2. Pins and plugs, upon termination, shall not be damaged in any way.

3.4 LABELING AND IDENTIFICATION

- A. All cable plant labeling and administration documentation shall conform to ANSI/TIA/EIA 606 Administration Standard.
- B. The cables within the rack or cabinets shall be numbered for identification.
- C. Equipment used for labeling shall be: Brother "P-Touch" model PT-1750. Label media shall be black typeface on white tape. Tape material shall be 1/2" wide.
- D. Components shall be marked where they are administrated (label at all punch down points, panels, blocks, outlets, etc.).
- E. Industry standard color fields should be used where applicable as described in the Standards.
- F. All pathways labeled (conduit, trays, etc.).
- G. Data UTP Labeling
 1. Wiring termination locations shall be labeled to corresponding pairs at the MDF, IDF, C IDF and at each workstation end.
 2. Cables shall be labeled no more than 3" back from each end of the termination point with a cable label that matches the faceplate labeling.
 3. Contractor will provide tags, straps and adhesive labels. These tags, straps and adhesive labels shall be of high quality that will endure over time.
 4. Hand written labels are not acceptable.
 5. Each drop shall have a unique label throughout the site. This would allow a cable management system to track each cable pair.
 6. Labeling Scheme:
- H. Workstation Labeling: The faceplate or surface block shall be labeled with the Room # of the IDF where the cable sources from, the Room # the cable terminates in, and the sequential workstation number (ex. B10(IDF)-B2(RJ45 jack)-09(Workstation number). Each room shall have a sequential workstation number starting with the number 01 (ex. B10-B2-01 through B10-B2-10 and B10-B3-01 through B10-B3-10). The labeling itself shall be in a white background with black lettering.
- I. Closet Labeling: Patch panel shall be labeled with the Room # the cable terminates in (RJ45 jack) and sequential workstation number only. The labeling itself shall be in a black background with white lettering.
- J. Data Fiber Optics Labeling
 1. Fiber termination locations shall be labeled to corresponding fiber strands pairs at the MDF, IDF, and C IDF.
 2. The labeling scheme will be provided by the District and will be specific up to and

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- including instructions for the placement of labeling, tags, straps, and adhesive labels.
3. Contractor is expected to provide tags, straps and adhesive labels. These tags, straps and adhesive labels shall be of high quality that will endure over time.
 4. Hand written labels are not acceptable.
 5. Labeling Scheme:
 - i) Each drop shall have a unique label throughout the site. This would allow a cable management system to track each cable.
 - ii) Cables shall be labeled approximately 12 inches back from the point where the cable enters the fiber enclosure with a cable label that identifies the origin and destination of the cable.
 - iii) Closet labeling; each connection shall be labeled denoting each strands color, origin and destination with name of room or wing.
 - iv) The type (single-mode or multi-mode) of fiber optic cable used shall be clearly labeled on the fiber patch panel per drawn details.
 - v) Color-coding shall conform to EIA/TIA specifications.

3.5 TESTING OF THE CABLING PLANT

- A. Contractor is responsible for supplying all of the required test equipment used to conduct acceptance tests.
- B. District reserves the right to be present during any or all of testing.
- C. All cabling not tested strictly in accordance with these procedures shall be re-tested at no additional cost to the District.
- D. 100% of the installed cabling must be tested. All tests must pass acceptance.
- E. Test equipment shall be fully charged prior to each day's testing.
- F. Test reports must be submitted in hardcopy or electronic format. Hand-written test reports are not acceptable.
- G. Hardcopy reports are to be submitted in labeled 3 ring binders with an attached affidavit verifying passing execution of all tests. For large installations electronic reports with hardcopy summaries are preferred. Hardcopy summary reports shall contain the following information on each row of the report: circuit ID, test specification used, length, date of test, and pass/fail result.
- H. Electronic reports are to be submitted on CD format. If proprietary software is used, CD shall contain any necessary software required to view test results. If the results are delivered in a standard format like Excel, Access, CSV files, etc. then software to read these files are not provided. Electronic reports must be accompanied by a Certificate signed by an authorized representative of the Contractor warranting the truth and accuracy of the electronic report. Certificate must reference traceable circuit numbers that match the electronic record.
- I. Test reports shall include the following information for each cabling element tested:
 1. Wire map results that indicate the cabling has no shorts, opens, miswires, split, reversed, or crossed pairs, and end to end connectivity is achieved.

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2. For Category 6 and 6A cabling: Attenuation, NEXT, PSNEXT, Return Loss, ELFEXT, and PSELFEXT data that indicate the worst case result, the frequency at which it occurs, the limit at that point, and the margin. These tests shall be performed in a swept frequency manner from 1 MHz to highest relevant frequency, using a swept frequency interval that is consistent with TIA and ISO requirements. Information shall be provided for all pairs or pair combinations and in both directions when required by the appropriate standards. Any individual test that fails the relevant performance specification shall be marked as a FAIL.
3. Length (in meters), propagation delay, and delay skew relative to the relevant limit. Any individual test that fails the relevant performance specification shall be marked as a FAIL.
4. Cable manufacturer, cable model number/type, and NVP
5. Tester manufacturer, model, serial number, hardware version, and software version
6. Circuit ID number and project name
7. Auto-test specification used
8. Overall pass/fail indication
9. Date of test
10. Test reports shall be submitted within 7 business days of completion of testing.

3.6 TEST EQUIPMENT

- A. Test equipment used under this contract shall be from manufacturers that have a minimum of 5 years experience in producing field test equipment. Manufacturers must be ISO 9001 certified.
- B. All test tools of a given type shall be from the same manufacturer, and have compatible electronic results output.
- C. Test adapter cables must be approved by the manufacturer of the test equipment. Adapters from other sources are not acceptable.
- D. Baseline accuracy of the test equipment must exceed TIA Level III, as indicated by independent laboratory testing.
- E. Test equipment must be capable of certifying Category 6 and 6A and 6 links.
- F. Test equipment must have a dynamic range of at least 100 dB to minimize measurement uncertainty.
- G. Test equipment must be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.
- H. Test equipment must include S-Band time domain diagnostics for NEXT and return loss (TDNXT and TDRL) for accurate and efficient troubleshooting.
- I. Test equipment must be capable of running individual NEXT, return loss, etc measurements in addition to auto-tests. Individual tests increase productivity when diagnosing faults.

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- J. Test equipment must include a library of cable types, sorted by major manufacturer.
- K. Test equipment must store at least 1000 Category 6 and 6A or 6 auto-tests in internal memory.
- L. Test equipment must be able to internally group auto-tests and cables in project folders for good records management.
- M. Test equipment must include DSP technology for support of advanced measurements.
- N. Test equipment must make swept frequency measurements in compliance with TIA standards.
- O. The measurement reference plane of the test equipment shall start immediately at the output of the test equipment interface connector. There shall not be a time domain dead zone of any distance that excludes any part of the link from the measurement.

3.7 MDF/IDF/CIDF INSTALLATION PARAMETERS

- A. UTP cabling shall conform to a 6 foot separation requirement from main power panels, Switch gear and/or starter motors adjacent to the IDF and termination locations.
- B. All data, voice and communications racks and cabinets shall be anchored in accordance with manufacturer specifications and drawn details, to walls and floors and grounded to building ground grid (not to water pipes, etc.). Individual or new ground points are acceptable.
- C. All floor mounted racks and cabinets shall have ladder racking from top of rack or cabinet to nearest wall as directed by consultant.
- D. Wall mounted racks and cabinets.
 - 1. Backboards shall be made of fire retardant or treated materials. Outside backboards shall be mounted squarely cut, with sanded edges, void free and painted. Backboards made from particle or pressed board materials are not acceptable. Backboards shall be a minimum size of $\frac{3}{4}$ " thick x 36" wide x the height of the rack or cabinet. Backboard shall be painted with white fire-retardant paint.
 - 2. Inside backboards shall be mounted squarely cut, with sanded edges and void free. Inside backboard shall match the inside dimensions of the installed cabinet. Inside backboard shall be a minimum thickness of $\frac{3}{4}$ ".
 - 3. All new racks and cabinets shall be securely mounted to wall studs in accordance with manufacturer specifications and drawn details.
- E. All new and existing racks and cabinets shall have a dedicated 110V/AC double duplex outlet installed per specification section, California Electrical Codes, and drawing details.

3.8 DOCUMENTATION AND DRAWINGS

- A. As a pre-requisite for the acceptance of the work, the Contractor shall provide all of the following information. The Contractor shall prepare and provide 2 copies of a complete

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Cable Book as documentation. This cable book shall consist of the following:

1. Title of Project
 2. Index page detailing the following sections
 3. Site plans (as-built drawings)
 4. Drawings shall be professionally drafted (to scale, within a border similar to design drawings) and reproducible. Hand written drawings are not acceptable.
 5. The drawings shall depict, at a minimum, the following conditions:
 - a. The exact MDF/IDF/CIDF locations
 - b. Size and routing of backbone cable from each IDF to the MDF.
 - c. Station locations and their exact labeling ID(s) which shall match the physical label at the device.
 - d. New pathways, conduit, ground boxes, junction boxes, raceway, power poles and floor monuments.
 - e. Any other new conditions.
 6. Contractor shall provide 3 sets of as-built drawings, one of which shall be reproducible.
 7. In addition to the hard copy requirements, the as-builts, one of which shall be generated on Visio, and supplied to District. Media shall be recordable CD.
 8. The Contractor shall submit as-built drawings and media no later than 30 days after the installation date.
 9. Price list and contact information for emergency service work.
- B. Fiber backbone test results
1. In sequential order by IDF number
- C. Data station cable test results
1. In sequential order by IDF and then drop number.
- D. Voice feeder test results.
1. In sequential order by IDF number.
 2. Station/Feeder connectivity spread sheet (8-1/2" x 11" hard copy and electronic file, Microsoft Excel format).
- E. Voice station cable test results.
1. In sequential order by IDF number.
 2. Station/Feeder connectivity spread sheet (8-1/2" x 11"hard copy and electronic file, Microsoft Excel format).
- F. Warranty certificates and documentation.

3.9 WARRANTY AND SUPPORT SERVICE

- A. The warranty shall commence from the date of final written acceptance by the Owner.
- B. All conditions for obtaining the manufacturer's Performance Warranty shall be the sole responsibility of the contractor.
- C. The contractor shall maintain a competent service organization and shall, if requested, submit a service maintenance agreement to the owner after the end of the guarantee period.

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- D. A typewritten notice shall be posted at the equipment rack that shall indicate the firm, address and telephone number to call when service is necessary. The notice shall be mounted in a neatly finished metal frame with a clear plastic window and securely attached to the inside of the door.
- E. Extended Product Warranty and Application Assurance:
 - 1. The 25 Year Extended Product Warranty shall ensure against product defects, that all approved cabling components exceed the specifications of TIA/EIA 568A and ISO/IEC IS 11801, exceed the attenuation and NEXT requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for cabling links/channels, that the installation will exceed the loss and bandwidth requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for fiber links/channels, for a twenty (20) year period. The warranty shall apply to all passive SCS components. The 25 Year Extended Product Warranty shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective product(s) for a twenty (25) year period.
 - 2. The 25 Year Application Assurance shall cover the failure of the wiring system to support the application which it was designed to support, as well as additional application(s) introduced in the future, up to 1000 Mbps parallel transmission schemes, by recognized standards or user forums that use the TIA/EIA-568A or ISO/IEC IS 11801 component and link/channel specifications for cabling, for a twenty (20) year period.
 - 3. Upon successful completion of the installation and subsequent inspection, the Owner's Project Manager shall be provided with a numbered certificate, from the manufacturing company, registering the installation.
- F. Contractor shall provide extra service upon request on a 24 hour-a-day, 365 day-a-Year basis. Pricing for such service shall be described in the "Cable Book" Documentation.

3.10 FINAL ACCEPTANCE

- A. The Owner or Owner's representative may visit the site during the installation of the system to ensure that correct installation practices are being followed.
- B. The Owner or Owner's representative will conduct a final job review once the contractor has finished the job. The review will take place within one week after the contractor notifies the owner.
- C. Two copies of all certification data and drawings for all identifications shall be provided to the Owner before the Owner's review.
- D. The Owner or Owner's representative will review the installation and certification data prior to the system acceptance.
- E. The Owner or Owner's representative may test some of the systems features to ensure that the certification data is correct. If a substantial discrepancy is found, the Owner reserves the right to have an independent consultant perform a certification of the entire system. If such a procedure is undertaken, the cost of the testing will be billed back to the contractor.
- F. In the event that repairs or adjustments are necessary, the contractor shall make these

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repairs at his own expense. All repairs shall be completed within 10 days from the time they are discovered.

END OF SECTION

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SECTION 28 46 00

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes fire alarm systems.
- B. Definitions:
 - 1. FACP: Fire alarm control panel.
 - 2. LED: Light-emitting diode.
 - 3. Definitions in NFPA 72 apply to fire alarm terms used in this Section.
- C. Fire Alarm system Description:
 - 1. analog addressable, noncoded system; multiplexed signal transmission dedicated to fire alarm service only.
- D. Performance:
 - 1. Comply with NFPA 72.
 - 2. Premises protection includes all the buildings in the school including portable classrooms.
 - 3. Fire alarm signal initiates by one or more of the following devices:
 - a. Manual stations.
 - b. Heat detectors.
 - c. Smoke detectors.
 - d. Verified automatic alarm operation of smoke detectors.
 - 4. Fire alarm signal initiates the following actions:
 - a. Alarm notification appliances shall operate continuously.
 - b. Identify alarm at the FACP and remote annunciators.
 - c. Transmit an alarm signal to the remote alarm receiving station.
 - d. Record events in the system memory.
 - 5. Fire Alarm system trouble signal initiates one or more of the following devices or actions:
 - a. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.

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- b. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.
 - c. Loss of primary power at the FACP.
 - d. Ground or a single break in FACP internal circuits.
 - e. Abnormal ac voltage at the FACP.
 - f. A break in standby battery circuitry.
 - g. Failure of battery charging.
 - h. Abnormal position of any switch at the FACP or annunciator.
6. System Trouble and Supervisory Signal Actions: Ring trouble bell and annunciate at the FACP and remote annunciators.

1.2 SUBMITTALS

- A. Product Data and Samples: For each type of product indicated.
- B. Shop Drawings Generated by Existing System Manufacturer:
 - 1. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
 - 2. Device Address List: Coordinate with final system programming.
 - 3. System riser diagram with device addresses, conduit sizes, and cable and wire types and sizes.
 - 4. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
 - 5. Batteries Calcs and Voltage Drop: Submit manufacturer generated battery load and voltage drop calcs.
- C. Field quality-control test reports.
- D. Operation and maintenance data.
- E. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals specified in Division 1 Section "Submittals," make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Architect for review.
- F. Documentation:

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1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner, Architect, and authorities having jurisdiction.
2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner, Architect, and authorities having jurisdiction. Format of the written sequence of operation shall be the optional input/output matrix.
 - a. Hard copies on paper to Owner, Architect, and authorities having jurisdiction.
 - b. Electronic media may be provided to Architect and authorities having jurisdiction.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 Equipment:

A. MANUFACTURERS

1. EXISTING FACP
 - a. Fire-Lite MS-10UD
2. Wire and Cable:
 - a. West Penn Wire/CDT; a division of Cable Design Technologies.
 - b. Comtran Corporation.
 - c. Helix/HiTemp Cables, Inc.; a Draka USA Company.
 - d. Rockbestos-Suprenant Cable Corporation; a Marmon Group Company.
3. Analog addressable initiating devices on SLC loop (pull stations, monitor modules, heat and smoke detectors):
4. Audible and Visual Signals:
 - a. Cooper Wheelock.

B. Circuits

1. Signaling Line Circuits: NFPA 72, Class B, Style 4.

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- a. System Layout: Install no more than 70 addressable devices on each signaling line circuit.
 2. Notification-Appliance Circuits: NFPA 72, Class B, Style Y.
 3. Actuation of alarm notification appliances annunciation, elevator recall, shall occur within 10 seconds after the activation of an initiating device.
 4. Electrical monitoring for the integrity of wiring external to the FACP for mechanical equipment shutdown and magnetic door-holding circuits is not required, provided a break in the circuit will cause doors to close and mechanical equipment to shut down.
- C. Smoke-Alarm Verification:
1. Initiate audible and visible indication of an "alarm verification" signal at the FACP.
 2. Activate a listed and approved "alarm verification" sequence at the FACP and the detector.
 3. Record events.
 4. Sound general alarm if the alarm is verified.
 5. Cancel FACP indication and system reset if the alarm is not verified.
- D. Notification-Appliance Circuit: Operation shall sound in a 60 beats per minute, march-time pattern.
- E. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.
- F. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the FACP and remote annunciators, after initiating devices are restored to normal.
1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
 2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
 3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.
- G. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. Enabling of this mode shall require the entry of a password. The FACP and annunciators shall display a test indication while the test is underway. If testing ceases while in walk-test mode, after a preset delay, the system shall automatically return to normal.

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- H. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, trouble, and supervisory signals to a remote alarm station through a digital alarm communicator transmitter and telephone lines.
 - I. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory and digital alarm communicator transmitter shall be powered by the 24-V dc source.
 - 1. The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.
 - 2. Power supply shall have a dedicated fused safety switch for this connection at the service entrance equipment. Paint the switch box red and identify it with "FIRE ALARM SYSTEM POWER."
 - J. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.
 - 1. Batteries: Vented, wet-cell pocket, plate nickel cadmium.
 - 2. Battery and Charger Capacity: Comply with NFPA 72.
 - K. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.
- 2.2 MANUAL FIRE ALARM BOXES
- A. Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Single-action mechanism type, with integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
- 2.3 SYSTEM SMOKE DETECTORS
- A. General Description:
 - 1. UL 268 listed, operating at 24-V dc, nominal.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
 - 3. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.
 - 4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

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5. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.

B. Photoelectric Smoke Detectors:

1. Sensor: LED or infrared light source with matching silicon-cell receiver.
2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.

2.4 HEAT DETECTORS

A. General: UL 521 listed.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or rate-of-rise of temperature that exceeds 15 deg F (8 deg C) per minute, unless otherwise indicated.

1. Mounting: Plug-in base, interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).

1. Mounting: Plug-in base, interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

2.5 NOTIFICATION APPLIANCES

A. Description: Equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn.

C. Visible Alarm Devices: Wall mount strobes with field selectable candela settings of 15/30/75/110cd or 135/185cd(Multi-candela models). Strobe lights to be listed under UL 1971, UL 1480, CSFM approved. Complies with OSHA 29 Part 1910.165. Produce 1 flash per second with wide UL "Regulated Voltage" of 16 - 33 volts using filtered DC. Provide with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output: As required per NFPA 72.
2. Strobe Leads: Factory connected to screw terminals.

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2.6 REMOTE ANNUNCIATOR

- A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, resetting, and testing.
 - 1. Mounting: Flush cabinet, NEMA 250, Class 1.
- B. Display Type and Functional Performance: Alphanumeric display same as the FACP. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FACP.

2.7 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts.
- B. Integral Relay: Capable of providing a direct signal to the elevator controller to initiate elevator recall and to a circuit-breaker shunt trip for power shutdown.

2.8 WIRE AND CABLE

- A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NEC, Article 760.
- B. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG and as recommended by system manufacturer.
 - 1. Circuit Integrity Cable: Twisted shielded pair, NEC Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.
- C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Smoke or Heat Detector Spacing:
 - 1. Smooth ceiling spacing shall not exceed the rating of the detector.
 - 2. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.

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3. Spacing of heat detectors shall be determined based on guidelines and recommendations in NFPA 72.
- B. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.
 - C. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
 - D. Visible Alarm-Indicating Devices: Install 6 inches (150 mm) below the ceiling.
- 3.2 WIRING INSTALLATION
- A. Install wiring according to the following:
 1. NECA 1.
 2. TIA/EIA 568-A.
 - B. Wiring Method: Install wiring in metal raceway according to Division 16 Section "Raceways and Boxes."
 1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
 - C. Wiring Method:
 1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
 2. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.
 - D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
 - E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
 - F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

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- G. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum 1-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.
- H. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the FACP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals according to Division 26 Section "Basic Electrical Materials and Methods - Electrical Identification."
- B. Install instructions frame in a location visible from the FACP.
- C. Paint power-supply disconnect switch red and label "FIRE ALARM."

3.4 GROUNDING

- A. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
 - 2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters.
 - 3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
 - 4. Testing: Follow procedure and record results complying with requirements in NFPA 72.
 - a. Detectors that are outside their marked sensitivity range shall be replaced.
 - 5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NEC.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices. Refer to Division 1 for Closeout Procedures.

END OF SECTION

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